Government
Publications

SESSIONAL PAPERS

VOL. XXXI.—PART VI.

FIRST AND SECOND SESSIONS,

NINTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO.

SESSIONS 1898-9.

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No. 2.. Report of the Minister of Education for the year 1898, with the Statistics of 1897. Presented to the Legislature 3rd March, 1899. *Printed.*

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No. 5.. Report of the Commissioner of Crown Lands for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*

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No. 8.. Report on the working of the Tavern and Shop Licenses Acts for the year 1898. Presented to the Legislature 15th February, 1899. *Printed.*

No. 9.. Report of the Commissioner of Public Works for the year 1898. Presented to the Legislature 23rd February, 1899. *Printed.*

No. 10.. Report of the Inspector of Insurance and Registrar of Friendly Societies for the year 1898. Presented to the Legislature 27th February, 1899. *Printed.*

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No. 13.. Report upon the Houses of Refuge and Orphan and Magdalen Asylums of the Province for the year ending 30th September, 1898. Presented to the Legislature 29th March, 1899. *Printed.*

No. 14.. Report upon the Hospitals of the Province for the year ending the 30th September, 1898. Presented to the Legislature 27th March, 1899. *Printed.*

No. 15.. Report upon the Institution for the Education of the Blind, Brantford, for the year ending 30th September, 1898. Presented to the Legislature 8th February, 1899. *Printed.*

No. 16.. Report upon the Institution for the Education of the Deaf and Dumb, Belleville, for the year ending 30th September, 1898. Presented to the Legislature 8th February, 1899. *Printed.*

No. 17.. Report of the Work under the Children's Protection Act for the year 1898. Presented to the Legislature 23rd February, 1899. *Printed.*

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No. 19.. Report of the Agricultural and Experimental Union of Ontario for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*

No 20.. Report of the Fruit Growers' Association of Ontario for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*

No. 21.. Report of the Fruit Experiment Stations of Ontario for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*

No. 22.. Report of the Superintendent of Spraying for the year 1898. Presented to the Legislature 17th March, 1899. *Printed.*

No. 23.. Report of the Entomological Society of Ontario for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*

No. 24.. Report of the Bee Keepers' Association for the Province for the year 1898. Presented to the Legislature 22nd March, 1899. *Printed.*

No. 25.. Report of the Poultry and Pet Stock Association of the Province for the year 1898. Presented to the Legislature 22nd March, 1899 *Printed.*

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No. 32.. Report upon the Registration of Births, Marriages and Deaths in the Province for the year 1897. Presented to the Legislature 27th February, 1899. *Printed.*

No. 33.. Report of the Ontario Game and Fish Commission. Presented to the Legislature 17th March, 1899. *Printed.*

No. 34.. Report of the Commissioners for the Queen Victoria Niagara Falls Park for the year 1898. Presented to the Legislature 24th February, 1899. *Printed.*

No. 35.. Report of the Royal Commission on Forest Protection and Perpetuation in Ontario, 1898. Presented to the Legislature 25th March, 1899. *Printed.*

No. 36. Analysis of Reports of Agricultural and Horticultural Societies of Ontario for the year 1897. Presented to the Legislature 22nd March, 1899. *Printed.*

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No. 39.. Report of the Board of Health for the year 1898. Presented to the Legislature 28th February, 1899. *Printed.*

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No. 41.. Report of the Provincial Municipal Auditor for the year 1898. Presented to the Legislature 20th February, 1899. *Printed.*

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No. 44.. Copy of Minutes of the Department of Education approving of certain Regulations. Presented to the Legislature 10th August, 1898. *Not printed.*

No. 45.. Copy of an Order in Council approving of Regulations governing the disposal of Water Powers. Presented to the Legislature, 19th August 1898. *Not printed.*

No. 46.. Copy of an Order in Council respecting the terms and conditions governing the lease of Corundum Lands. Presented to the Legislature 19th August, 1898. *Not printed.*

No. 47.. Copy of an Order in Council approving of Regulations for Mining Divisions. Presented to the Legislature, 24th August, 1898. *Not printed.*

No. 48... Copy of an Order in Council approving of certain amendments to the Regulations for Mining Divisions. Presented to the Legislature, 24th August, 1898. *Not printed.*

No. 49.. Copy of an Order in Council establishing the Michipicoten Mining Division. Presented to the Legislature, 24th August, 1898. *Not printed.*

No. 50.. Reports relating to Toronto University. Presented to the Legislature, 2nd March, 1899. *Printed.*

No. 51.. Report of the Librarian on the state of the Legislative Library. Presented to the Legislature, 2nd February, 1899. *Not printed.*

No. 52.. Report of the Inspector of the House of Refuge, County of Waterloo. Presented to the Legislature, 8th February, 1899. *Not printed.*

No. 53.. Copy of Order in Council respecting the payment of surplus Surrogate Court Fees to Judge Jamieson. Presented to the Legislature, 8th February, 1899. *Not printed.*

No. 54.. Copies of Orders in Council commuting Surrogate Court Fees of Judges Huges, Barron, Elliott, Doyle, Monck and Mosgrove. Presented to the Legislature, 8th February, 1899. *Not printed.*

No. 55.. Statement as to the disposal of the Sessional and Revised Statutes of Ontario. Presented to the Legislature, 8th February, 1899. *Not printed.*

No. 56.. Return to an Address to His Honour the Lieutenant-Governor of the tenth day of August, 1898, praying that he will cause to be laid before this House a Return of copies of all Orders in Council, correspondence and other documents relating to the deciding upon, and purchase of a site in the City of London for the proposed Normal School. Presented to the Legislature, 14th February, 1899. Mr. *Hodgens.* *Not printed.*

No. 57.. Return to an Order of the House of the seventeenth day of August, 1898, for a Return of copies of all correspondence and papers relating to, or connected with, the confinement of Hiram Augustus McCrea in the Asylums at Kingston and Brockville, and his release therefrom. Presented to the Legislature, 17th February, 1899. Mr. *Beatty (Leeds.)* *Not printed.*

No. 58.. Copy of an Agreement between the Inspector of Prisons and Public Charities and the Independent Cordage Company of Ontario (Limited), respecting the manufacture of Rope at the Central Prison, Toronto. Presented to the Legislature, 20th February, 1899. *Not printed.*

No. 59.. Report of the Master of Titles for the year 1898. Presented to the Legislature, 23rd March, 1899. *Not printed.*

No. 60.. Report of the Principal of Upper Canada College for the year ending 30th June, 1898, and statements shewing receipts and disbursements for the same period. Presented to the Legislature, 23rd February, 1899. *Printed.*

No. 61.. Copy of Contract, between Her Majesty the Queen and the Riordan Paper Company, for the supply of printing paper required by the Government of the Province of Ontario. Presented to the Legislature, 23rd February, 1899. *Not printed.*

No. 62.. Return to an Order of the House of the seventeenth day of August, 1898, for a Return showing the number of saw-logs cut during the winter of 1897-1898 on the limits of the Georgian Bay and on Lakes Huron and Superior, which were driven to either of said lakes; the quantity cut in Provincial mills, and the quantity of exported uncut. Presented to the Legislature, 23rd February, 1899 Mr. *Beatty (Leeds.)* *Not printed.*

No. 63.. Return to an Order of the House of the twenty fourth day of August, 1898, for a Return of copies of all correspondence between any member of the Government or representative thereof, and any party or parties, respecting the purchase of any timber berth that may have been sold since March 1st, 1898. Presented to the Legislature, 28th February, 1899. Mr. *Wardell.* *Not printed.*

No. 64.. Return to an Order of the House of the twenty-second day of February, 1899, for a Return of copies of all correspondence between any member of the Government and the License Inspector for the County of Lincoln, and any other person or persons, referring to or respecting the alleged connection of the Inspector with the business of cigar manufacture. Presented to the Legislature, 28th February, 1899. Mr. *Jessop.* *Not printed.*

No. 65.. Return to an Order of the House of the seventeenth day of February, 1899, for a Return of copies of all papers and documents in relation to the proposed contract for public printing, including specifications, tenders and a comparative statement shewing the different tenders for each item of the specification and the estimate of quantities required. Also, the total estimated amount of each tender. Also, of copies of all correspondence, if any, between the Queen's Printer and the heads of Departments as to preparation of specifications for contract for public printing. Also, of all reports, if any, of expert printers as to details of said specifications and also of all other correspondence appertaining thereto, or to the letting of the contract or conditions required from the contractor. Presented to the Legislature, 3rd March, 1899. Mr. *Matheson.* *Not printed.*

No. 66.. Return to an Order of the House of the twenty-sixth day of February, 1897, for a Return giving the names of all High School Teachers who have received Specialists' Certificates since 1885 as the result of examinations. The names of such teachers who received Specialists' Certificates on any other ground, stating the year in

which such certificate was granted, on what grounds, and the University standing of the recipient. Names of all applicants for such certificates who have been refused them, and on what grounds such refusal was based. Presented to the Legislature, 9th March, 1899. Mr. *Matheson*. *Printed.*

No. 67.. Return to an Order of the House of the twenty-seventh day of February 1899, for a Return of copies of all correspondence between the Government or any member thereof, and the Corporation of the Town of Lindsay, with reference to the appointment of a Police Magistrate and the salary to be paid him Also, copy of Order in Council appointing Police Magistrate at Lindsay. Presented to the Legislature, 9th March, 1899. Mr. *Fox*. *Not printed.*

No. 68.. Return to an Order of the House of the eighth day of March, 1899, for a Return of a copy of Miller's Report as to discovery of gold in the Township of Marmora, the same to be brought down during the present Session. Presented to the Legislature, 10th March, 1899. Mr. *McLaughlin*. *Not printed.*

No. 69.. Return to an Order of the House of the fifteenth day of December, 1897, for a Return of copies of all correspondence between the Minister of Education, or any official in the Department and Mr. Stewart of Glencoe, or any other person, in reference to the case of C. C. Grant of St. Thomas, who was charged with having obtained copies of the examination papers before the Matriculation Examination in 1896. Presented to the Legislature, 13th March, 1899. Mr. *Brower*. *Not printed.*

No. 70.. Return to an Order of the House of the sixth day of March, 1899, for a Return giving the number of circular letters, sent from the office of the Chief Game Warden, soliciting answers to a series of questions as to shooting deer while in the water. The names, addresses, occupations or professions of those to whom such circulars were addressed. Also, shewing the amount of money received from the sale of permits to kill deer during the season of 1898. Also, shewing balance left after paying salaries of Game Wardens, all expenses of offices and all moneys paid to or on behalf of Game and Fish Commissioners during the year 1898, in so far as the information is not contained in the Report of the Department. Presented to the Legislature, 21st March, 1899. Mr. *Pyne*. *Not printed.*

No. 71.. Return to an Order of the House of the sixth day of March, 1899, for a Return, giving the names, addresses, occupations or professions of all persons to whom permits were granted, during the year 1898 to collect birds, birds nests and eggs under provisions of the Act of 1889 for the protection of insectivorous and other birds. Also, of renewals and new permits which have been granted during the current year. Also, shewing number of convictions for violations of the Act during the year 1898, and specifying localities. Presented to the Legislature, 21st March, 1899. Mr. *Pyne*. *Not printed.*

No. 72.. Return to an Order of the House of the sixth day of March, 1899, for a Return, shewing all fees paid to Alfred Stunden, a constable of the Town of Bracebridge, in connection with the enforcement of the Game Laws of the Province. Presented to the Legislature, 21st March, 1899. Mr. *Reid* (*Addington.*) *Not printed.*

No. 73.. Report of the Clerk of Forestry for the year 1898. Presented to the Legislature, 25th March, 1899. *Printed.*

No. 74.. Copy of Agreement between Her Majesty the Queen and the Sturgeon Falls Pulp Company, Limited. Presented to the Legislature, 25th March, 1899. *Printed.*

No. 75.. Return shewing the Fees and Emoluments of the Registrars of Deeds of the Province for the year 1898, with which are contrasted receipts of the same nature in the years 1896 and 1897. Presented to the Legislature, 27th March, 1899. *Not printed.*

No. 76.. Return to an Order of the House of the eighth day of March, 1899, for a Return, shewing the number of Police Magistrates in Ontario, their names, residences, dates of appointment and territory over which they have jurisdiction, and shewing as well their respective salaries. Presented to the Legislature, 27th March, 1899. Mr. *Fox.* *Not printed.*

No. 77.. Return to an Order of the House of the ninth day of March, 1899, for a Return shewing the number of cases entered in the County Court of the County of Ontario for the past five years; the amount of money collected through the Sheriff during the same period and shewing as well the number of cases entered in the Division Court of the same County during the past five years, and the amount of money collected in the Court during the same period. Also, shewing the number of cases that went to trial in each Court respectively. Together with a statement of the number of cases heard or tried in the County Judges Criminal Court, the number of days in which the County Judge was engaged in revising voter's lists, in attending board of audit criminal justice accounts, the selection of jurors, and in the performance of duties under the Overholding Tenants Act and in the performance of other duties imposed upon him by law during the said period Presented to the Legislature, 27th March, 1899. Mr. *Hoyle* and *Attorney-General.* *Not printed.*

No. 78.. Correspondence and general information in respect of the application for grants of public money in aid of the construction of certain portions of the Central Counties Railway, the Central Ontario Railway, the Haliburton, Whitney and Mattawa Railway, the Irondale, Bancroft and Ottawa Railway, the James' Bay Railway, the Ontario, Belmont and Northern Railway, the Ontario and Rainy River Railway, and the Ontario, Hudson's Bay and Western Railway. Presented to the Legislature, 29th March, 1899. *Printed.*

No. 79.. Report of the Secretary and Registrar of the Province for the year 1898. Presented to the Legislature, 29th March, 1899. *Printed.*

No. 80.. Report on the operations of the Ontario Gold Concessions, Limited. Presented to the Legislature, 29th March, 1899. *Printed.*

No. 81.. Report of the Attorney-General upon the indebtedness of the Townships of Dunwich and Aldborough in respect of certain drainage works. Presented to the Legislature, 31st March, 1899. *Not printed.*

THIRD ANNUAL REPORT

OF THE

PROVINCIAL INSTRUCTOR IN ROAD-MAKING

ONTARIO

1898.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE.)

PRINTED BY ORDER OF

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1899.

THIRD ANNUAL REPORT

OF THE

PROVINCIAL INSTRUCTOR IN ROAD-MAKING,

1898.

To the Honorable JOHN DRYDEN,
Minister of Agriculture.

SIR.—I have herewith the honor to submit to you my third annual report, for the year 1898, on Road and Street Improvement in Ontario.

I have the honor to be,

Sir,

Your obedient servant,

A. W. CAMPBELL,
Provincial Instructor in Road-making.

PARLIAMENT BUILDINGS, TORONTO,
ONTARIO, 20th March, 1899.

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THIRD ANNUAL REPORT

OF THE

PROVINCIAL INSTRUCTOR IN ROAD-MAKING.

TRANSPORTATION.

The question of transportation is every year assuming a greater prominence, a deeper meaning to the people of Canada. Every year is turning greater activity renewed energy towards the improvement and extension of canals and railways,, harbors, and all facilities for carriage and traffic associated with them. The inauguration of a domestic and foreign penny postage, which marked the beginning of the present year, was but another expression of the desire for free and uninterrupted communication, not only within the country but with other nations as well; so also the introduction of the telephone and telegraph of comparatively recent years. Lands excepted, the value to man of most material things is created, in part at least, by transferring them from their original position to another. Transportation is one of the most important problems occupying the minds of engineers to-day, and no field offers more reliable and remunerative opportunities for investment.

The national life of Canada is but in its infancy, and we have a country of magnificent distances and resources. The feeling that our means of communication cannot be too numerous is steadily on the increase, and the leading minds of the country have taken this view of the situation. New railways are needed, and new canals are needed to develop areas not yet reached, to provide less expensive, more capacious and more rapid transportation, to regulate rates, and to stimulate invention and enterprise towards securing cheaper methods and means of carriage.

Public opinion has moved rapidly and energetically along the policy of improving the larger means of transportation, ocean carriage, canals, railways; on the other hand the arteries and veins leading to and from these, and which are of such vital importance to the Ontario farmer and through him to the country as a whole, have been sadly overlooked, with the result that a bushel of wheat belonging to the Manitoba farmer can be carried by boat to Montreal or New York, a distance of over 1,200 miles, and handled at each terminus for about four cents; or only twice the amount it costs the Ontario farmer to deliver his wheat at the nearest market over the country road.

That there is an important relation between the common highway and the greater avenues of trade is plainly apparent; an importance which is greatly intensified by its bearing upon agriculture, and the value of agricultural prosperity to the Province. Fruit culture, the dairy, grain production, every department of farm enterprise is intimately associated with and dependent upon transportation, though in varied matters of detail.

Wheat, to which reference has been made, is but an example. The great waterways extending from the head of Lake Superior to the Atlantic Ocean the Canadian Pacific Railway extending across the continent, have brought into competition with the farmers of Ontario the wide grain-producing areas of the North-West. The wheat of Central Russia has easy access to the markets of the world by means of the Volga; Hungary possesses the Danube as a cheap water route; the Argentine Republic is served by the Rio de la Platte and the Parana, whereby ocean vessels may ascend a distance of 500 miles in the interior of the country. Africa with its great water routes from the interior of the continent to the seaboard, with its railways now under rapid construction, will no doubt soon enter into active production from its almost illimitable wheat areas. The surplus from these countries reaches the markets of the world by systems of transportation, the cost of which is being steadily lessened, and the result upon the agriculture of Ontario, the basis of our wealth, must be very marked indeed.

The farmer pays the cost of transportation. When the price of wheat at Fort William is one dollar a bushel, the farmer living at that place receives that amount for the grain he delivers at the elevator. On the other hand the farmer delivering his wheat at Edmonton receives one dollar, less the cost of carriage and handling between Edmonton and Fort William. In the same way an English farmer who can haul his wheat to the market in London when wheat there is at $1.12 per bushel receives that amount for his grain; while on the other hand the Ontario farmer receives that amount less the cost of transportation and hauling between Ontario and London. The farmer of Argentina who raises his wheat as cheaply as the Ontario farmer and who delivers his wheat to the ocean vessel on the River Parana, has a cheaper means of transportation than has the Ontario farmer who has to pay for an expensive carriage by railway before reaching the seaboard.

The cost of labor and production is more nearly approximating the world over year by year; the value of the surplus supplied to the markets of the world is fixed by the lowest price accepted, not the highest or intermediate amount; the home marked is governed largely by the foreign market. The profit, therefore, which the Ontario farmer can derive from his produce depends to a very great extent upon a decrease in the cost of transportation. There is frequent complaint that the rates of railway and water communication are high, that they absorb too great a proportion of the farmer's profits. Nevertheless these rates are to-day much less than they were a quarter of a century ago—much less probably than could have been anticipated. And while the rate of railway and steamboat transportation is regarded as high, we are met with the very striking comparison that one ton can be carried by water for a thousand miles or more, and two hundred and fifty miles by rail, for the cost of moving one ton only five miles over the common roads.

While this great change and improvement has been affected with regard to rail and water carriage, the case has remained practically the same with regard to travel over the common roads. Ontario has 65,000 miles of country roads, and slightly over 6,500 miles of railway. With commendable enterprise, an immense amount of capital, both public and private, has been invested in the latter, with profit to the country and to the stockholder. It will scarcely be pretended, invaluable as the railways are, that they are of more importance to the country than is the primary system of transportation, the common highway. Yet so important have the railways been considered that had an equal amount been spent on the common roads these latter would have been built at an average cost of $3,000 per mile, obviously an expenditure which, judiciously applied to the roads in accordance with the requirements of traffic, would have made this Province one of the best paved countries in the world.

In minor ways the more local means of transportation are being facilitated. Bicycles are becoming more universally adopted as a convenient means of travel. Electric railways are radiating more and more from the centres of population. The automobile carriage has made progress during the year. They are to be counted by the hundreds in London, England; and by the thousands in Paris, France. Their manufacture has been vigorously started in Ontario, and a dozen or more are in use in Toronto, while their number is rapidly increasing. Although scarcely past the experimental stage, their great utility has been demonstrated. A brief period promises a more nearly perfected vehicle at a price much reduced from that for which they are now offered. When their use has more fully developed, they are likely to exercise a considerable influence upon the public roads, by creating a much greater demand for road improvement from the people of the towns. Present indications are that they will provide a cheap and convenient means of travel and transport, not merely within the towns, but over the country roads as well.

A most erroneous view has been taken by a few, of the influence of electric radial railways upon the use of the common highway, the belief being advanced that they would eventually lessen the importance of the common road. On the contrary, the electric road is more likely, by increasing the suburban and rural population, to increase the need of good roads. The roads are the feeders of the railroads and canals, and will retain the same relation to electric roads. Electric roads will no more do away with the necessity for the best common roads, than have railways done away with the necessity for deepening and widening our canals. All our means of communication and transportation are needed, all are more certain to increase rather than to decrease in importance. The presence of electric roads in a district will increase population, increase travel, increase the use of the common road; and, inversely, the improvement of the common road will increase the use of the electric road, acting as a feeder to it.

All our modes of travel, all means of conveyance have a decided tendency to remain, merely adjusting themselves to circumstances. Over the common road must first pass all the freight received by the railways, steam and electric; over the common road must pass all the freight delivered by the railways. The horse, in spite of other means of conveyance, must remain for use in farming operations, and as such must remain for use on the common roads to compete with and regulate the cost of transportation in a manner similar to the action of railways and canals upon one another.

That our roads are bad is due to various causes, some of which could have been avoided, while others could not. Chief among these latter, the unavoidable causes, are the sparseness of population whereby a long road mileage is necessary to serve a few farms; and the character of our climate, which, with great extremes of heat, frost and moisture, is not favorable to the easy maintenance of roads. Causes which could have been avoided are the unsatisfactory systems of road construction and control which, satisfactory at one time, have outlived their usefulness; the invariable tendency in a new country is towards work of a temporary kind to answer immediate wants without a view to permanency; and the fact that the great majority of the people of this country, not having travelled in European countries, have no conception of what they should achieve and demand in the way of good roads.

A most unfortunate lethargy has existed throughout Canada as to the need for better farm roads. The farmer has said: "We have horses which are often in idleness, we ourselves have plenty of time, and we can therefore afford to drive slowly through mud, carry small loads, be entirely shut in at times by impassable roads, cut off even from the post office, the market, the school, the church, the neighbor, rather than pay money, of which we have little, for better roads." The townsman has said: "If the farmer wishes to travel in the mud, live in isolation,

reach the town only once a month, he can do so. It is none of my concern. If he comes but seldom, when he does come he must buy more of my merchandise, that is all."

All this is radically wrong. It is mutually important to farmer and townsman that the country roads should be of the best, that traffic and intercommunication of all kinds should be brisk. Free and uninterrupted intercourse for the farmer in his commercial and social relations will advance the intelligence of the farming community, will create for the farmer more ways of money-making. The greater prosperity and refinement brings in their train greater needs, together with the means of obtaining them. Along the highways will flow wealth and culture, to be participated in by the villages, towns and cities which directly or indirectly, through the retail or wholesale merchants, are mainly dependent for support upon the agriculture of the Province.

The value of agricultural land is shown by experience to be in direct ratio to the condition of the roads by which it is reached. With no roads leading to it, land has no value. When the first wagon track is made, land first obtains a real worth. In proportion to the improvements made to the wagon track, the value of the land advances, and only when property possesses the best means of communication over first-class roads does it attain its greatest worth.

Distance is measured by time and ease of travel, not by miles. Land situated one mile from the market town, but with a boggy road intervening, is frequently of less value than an equally fertile property ten miles from the market, but having good roads communicating with it. A ten mile drive over a good road is easily less disagreeable than a drive of one mile over an excessively bad road. A wagon load of produce can frequently be drawn to market over ten miles of good road; while one mile of swampy, bad road, can render the moving of marketable produce an impossibility.

BETTER ROADS IN ONTARIO.

Road and street improvement has continued to be actively urged and discussed throughout Ontario during the year 1898 with most beneficial results. The procedure outlined in the first annual report of this department has not been materially altered. Public meetings have been held in all quarters of the Province, written reports made in a considerable number of instances, and literature distributed.

The most noticeable effect of educational influences has been, perhaps, a lessening to a remarkable degree of the prejudice and suspicion with which the movement was at first met, particularly in the agricultural sections. The desultory manner in which road improvement had been urged prior to the appointment of a Provincial Instructor in Road-making had done much to create a misapprehension with regard to the object of the reform. There was a feeling that the sole aim was the abolition of statute labor. There was an apprehension that in place of this, a burdensome system of taxation was proposed, and that the townships would be bonded for the purpose of constructing the roads in an expensive manner.

It is gratifying to record the very different feeling with which the problem is now met throughout the Province. There has been every success in drawing the attention of the people to the great benefit of good roads, and this has resulted in a desire to adopt the most approved methods for improving them, both as regards actual construction, and the system of control.

There has been some misconception with regard to the class of roads advocated for this Province. "Good Roads" so readily suggests the highest type of road found in England and other European countries, that many have at once concluded that similar roads were contemplated for this country. The proposition, viewed from this standpoint, naturally invited antagonism, as the expense consequent upon so radical a change would necessarily entail burdensome taxation.

"Better Roads" rather than "Good Roads" is perhaps more expressive of the true meaning of the present agitation for reform. The roads of to-day have reached their present state by a process of evolution and development, and it is only by a similar process for the future that the desired end can be reached in an economical manner. The difficulty, however, has arisen from the fact that the methods, up to within the last couple of years, have been nearly identical with those pursued by the pioneer settlers of the country a century ago. The same system, statute labor, has been almost universally employed and the same imperfect and erroneous ideas with regard to actual construction have prevailed. It is in the correction of these that the greatest hope for the future lies.

"Better Roads" are everywhere being built in the rural districts. This is to be seen largely in the drainage which heretofore has been so much neglected. A large amount in the aggregate has been spent on modern road machinery, chiefly graders and stone crushers, whereby a much greater extent of improvement has been made. In addition to better drainage and grading and the purchase of machinery, councils are appreciating the need of procuring better gravel and stone, more durable culverts, and are in many different ways evincing their greater interest in improving the roads.

All the cities of Ontario, nearly all of the towns and many of the villages, now use artificial stone (cement-concrete) sidewalks. In some of the smaller towns, such as Ingersoll, Tilsonburg, Aylmer, Ridgetown, nearly all the sidewalks have been relaid with this material, and most of it has been down for five or six years. Collingwood, Owen Sound, Kincardine, Walkerton, Listowel, Mt. Forest, Fergus, Guelph, Barrie, Stratford, St. Mary's, Woodstock, Strathroy, Chatham, Norwich, Galt, Berlin, St. Catharines, St. Thomas, Niagara Falls, Drummondville, Brockville, Cornwall, Kemptville, and others, have all laid large quantities during the past year.

As much interest is being taken in the proper construction of streets as of sidewalks, and where once the municipality provides a proper equipment of machinery and commences to work on right lines, the same progress will be made as in sidewalks. Within the last few years, Chatham, St. Catharines, St. Thomas, Stratford, Galt, Berlin, Woodstock, Brantford, Ingersoll, Niagara Falls, Barrie have all supplied themselves with complete outfits of road-making machinery, including rock crusher and steam roller, and are doing excellent work.

It is needless to say that the larger cities, Toronto, London, Ottawa, Kingston and Hamilton also possess these implements for the construction of macadam roads. In addition reference may be made to Peterborough, Brampton, Renfrew, Brantford, and Cornwall, where equally advanced steps are being taken. In Cornwall a by-law to raise $35,000 to be spent this year for road machinery and street improvement, was submitted to popular vote and passed. The spirit in which this work is advancing may be instanced by the following communication from G. H. Ferguson, a member of the council of Kemptville:

KEMPTVILLE, Ont. Sept. 27, 1898.

A. W. CAMPBELL, Esq., Prov. Instructor in Road-Making,
TORONTO, Ont. Can.

DEAR SIR,—Your letter of the 16th inst. I duly received. As you will perhaps remember we had about $6,000 to spend on street improvement this year, the balance of our loan being to take up outstanding debentures. We have built about 20,000 square feet of granolithic sidewalk at a cost of twelve and one half cents per square foot. We also invested in a champion rock crusher and roller at a cost of $1,000. We have built some macadam road much on the prin-

ciple laid down by you, and apparently it is an excellent piece of work. Of course time will tell what the quality is. The balance of our funds we propose expending also in macadam roads. The sample we put down here in the village has had the effect of starting an agitation in the surrounding municipalities on the good roads question, which no doubt will bear fruit in the near future.

Yours truly,

(Sgd.) G. H. Ferguson.

ROAD REFORM

The road reform movement has, in Ontario, passed through a number of interesting stages. In spite of the fact that the first organizers were, in the main, farmers, business, and professional men, and journalists, it was first attacked on the score of being a fad of the bicyclists. A little later as the bicycle became more and more generally recognized, not as the toy of a sportsman, but as a vehicle of practical utility even among farmers, this ground became untenable. The opposition then settled into a defence of statute labor in its entirety, while road reform was described as an effort to impose a burdensome tax upon the farmer for the construction of expensively built stone roads. All this has gone by, and we find councils and people accepting more and more the principles of the movement, and everywhere efforts are being put forth to carry them into practical execution. There is everywhere a reasonable desire to give statute labor due credit for the great amount of good it has done; to accept it still where the local circumstances make it advisable as a means of securing better roads; but where the condition of the people has so advanced, that statute labor is no longer a just, equitable and serviceable system of taxation, it should be abolished as any other unjust tax. That is the feeling which is rapidly developing throughout Ontario to-day, one which because of its reasonableness, it is useless to oppose or curb—we can only mould and direct it.

A century has gone by since the passing of the first statute labor law in Ontario. It was an Act of the first parliament of Upper Canada, convened by Lord Simcoe, the first Lieutenant-Governor, at Newark now Niagara-on-the-Lake. This was in 1796. Less than ten years later England and Scotland repealed their statute labor law because of the excessively bad condition of the roads, substituting a system of better management and expenditure which under, the methods of Macadam, Telford and McNeil, have amply justified the change. Ontario still retains the system of statute labor, and has learned few of the actual principles of road building from the men who worked so great a change in the roads of the Motherland.

The improvements made to the roads of Ontario are by no means all due wholly to statute labor. As a part of the first settlement duties, road allowances

were cleared of trees, and of stumps sufficiently to form a wagon track. Through the Huron Tract, the Canada Company spent large sums in opening up roads. The Governor's Road, from London to Toronto, the Kingston Road along Lake Ontario from Toronto to Kingston, the old stage road from Kingston to Montreal: the London and Hamilton Gravel road: the Sunnidale Road; the Hurontario Road, Yonge Street, the road from Hamilton to Niagara; these and many other roads in different parts of the Province are examples of the effect which Government aid, toll road companies, and individual efforts apart from statute labor, have had on the roads. In addition to this have been large annual expenditures of money by county and township councils.

Statute labor will do a certain amount toward the making of roads. In the brave pioneer days of this country, it did much toward taking out stumps, grading, corduroying; and has since done considerable toward gravelling or covering with broken stone in certain sections. But past a certain point statute labor will not improve the roads. When the roads have reached this point a backward trend is distinctly noticeable. They commence to deteriorate rather than improve. The incentive which actuates the pioneer who feels, desperately almost, the need of better communication with the market, the mill, his neighbor, has been lost. At this point statute labor commences to be performed in a perfunctory, shiftless, idle manner, becomes the farce that is rapidly condemning the system in all the older sections of the Province.

It is at this juncture that we turn to other countries for information as to the best course to pursue. In none of them do we find a system wholly applicable to Ontario, but our policy in this as in other matters in which we hope to progress should be to adopt that which is suitable to our conditions and surroundings, discarding that which is unsuitable.

A review of the systems used in countries which afford us a model for road construction indicates to us one great defect in our present methods. This is the inefficiency of oversight. In this respect our statute labor has become, not a system, so much as an entire absence of system. With any system rightly so called, there must be centralized control, directly responsible to the people. In France certain of the roads are maintained by the Government of the republic as national roads. The charge of these roads is deputed by the Government to the Chief Engineer who in turn allots different departments to the different members of his staff. Other roads are managed very much as county roads; others, of least importance, would correspond much to our township roads. In all these there is the one general principal—that of centralized control. On the roads of least importance the ratepayers may, if they so desire, work out their special road tax; but this work is done under the direction of a competent supervisor in whose charge the care of the roads is placed, and who is directly responsible for their condition and for the proper outlay of money and labor upon them.

In England, national roads do not exist, but in the county roads. and parish roads the principle of centralized control again is displayed. So it also is in Germany.

In Massachusetts, on this continent, we find the best models of road construction, built by the state. They are built and maintained by centralized authority; large sums are being expended by the state, and it is expected that ultimately one-tenth of the road mileage will be built in this way. This system it is expected, will serve two purposes. One is the construction, in a permanent and durable manner, of the leading highways of the State: the other that of educating the people of the State as to the necessity of having good roads and as to the best manner of building them, so that the roads of lesser importance, still under the control of township councils, will be built in a durable and economical manner.

As has been emphasized in a preceding paragraph, the lesson to be learned from such examples as this, is not that we should adopt the system of France or England, or Germany or Massachusetts—but that we should adopt the principle of centralized control.

It is useless to say that we need not look to more experienced countries for models, by asserting that we cannot afford to build such roads as France, England, Germany and Massachusetts possess. There is no part of the Ontario Good Roads movement which advocates for this Province such expensive stone roads. But, we, if our resources are less, must husband them more carefully, apply them more judiciously and skilfully—and for this we must seek the advice of older and more experienced countries. If the various municipalities are spending as much as they consistently can on their highways, then the only means of improving the roads is to improve the methods of building and maintaining them.

There is no desire on the part of the road reformer to adopt revolutionary plans. It is rather by a process of development and growth that reform should be accomplished. How then, to apply the principle of centralized control to our present system is the first part of the problem to present itself. The trend of thought as we find it in many parts of Ontario affords a solution. County councils are taking over leading roads to build and maintain and over these competent supervisors and foremen are being placed. The feeling adverse to statute labor is rapidly increasing, township councils will find it necessary to abolish it, and over the township roads will be placed competent foremen and supervisors. However radical the ultimate outcome may seem to those who still have faith in statute labor, the process of reaching it will be one of development and growth, a gradual change. Where the system is retained, statute labor will be less and less faithfully performed, the annual appropriations of township councils will be compelled to increase, and statute labor will shrink to less and less until extinct. It is merely

a process of evolution—an instance of the survival of the fittest. It vanished from England and Scotland nearly a century ago. In the older portions of Ontario it is slowly but surely passing away.

Taxes always have been, probably always will be unpopular. One cause for this is that the reason for taxation is not asked; money paid in taxes is considered a direct loss, almost highway robbery, from which no return is received. The real spirit of a tax, however, is a united effort of citizens in obtaining some common necessity. Take for example, the money spent on roads. What would be the result if this tax were utterly abolished, no work done on the roads, no roads provided, and each man left to build a road to the market-town for himself alone? The supposition is so impracticable that it is absurd. Under such circumstances we would quickly find farmers clubbing together their money and work as they found themselves mutually interested, until we would have practically a township corporation again formed and a tax established. It is the same with schools, the same with the administration of justice, the construction of drains, etc. Taxes are a measure of economy, not extravagance. They are an unalterable example of the old adage—"in union is strength." While the principle of taxation thus commented on may seem to many too simple for consideration, it is an axiom few stop to consider, it is frequently lost sight of, and taxation becomes unreasonably unpopular.

It is this unreasonable unpopularity that so frequently lends strength to the question "What will good roads cost us?" Does the same man refuse to build fences, a stable, a house, because of the cost? What would it cost him if he did not fence his farm? What would it cost if he allowed his horses and cattle to remain unprotected all winter instead of providing warm stabling? What would it cost if he lived in a log cabin instead of a comfortable house? What are bad roads costing him?

When we commence to consider what bad roads are really costing us, the sum of it all becomes very difficult to comprehend. The cost of good roads can be stated in dollars and cents, but it is not so with bad roads. Bad roads are costing some citizens of Ontario half their lifetime in driving over them; to drive one mile occupies the time that it would take to drive five if the roads were good. They are costing many a farmer much of the self respect he feels when driving along a good road at a good pace with clean buggy, clean harness and clean horse. They are costing our farmers small sums which soon aggregate large sums, in repairs to wagons, buggies, harness and whips. They are costing the privilege of attending church and public meetings at many seasons of the year. They are costing the young people of the farms a considerable part of their education; costing them the privileges of society which every healthy mind demands. They are costing the rural districts a large share of their population which, in disgust at the stagnancy of farm life, drifts to the city, overflowing the profes-

sions and trades, and lessening the value of farm property. This and much more is the cost of bad roads. To doubt that the loss is much more is to forget the loss incurred by the business aspect of farming, by trade and commerce, by the railway and transportation system, by the manufacturing and dairying industries, all of which are both direct and indirect losers.

If then we centralize control by placing properly qualified supervision over our roads; and if, in providing proper means to carry out the work under this supervision it is found necessary to substitute for the cumbersome statute labor, a special road tax, what are some of the plain, practical improvements which would be made on the roads? A plain, practical question, requiring, however, a volume to fully answer.

Carried out as it should be, and would be, for the citizens would demand it, the road machinery would be handled to better effect, work would be done at the most suitable season of the year or whenever repairs were demanded; improvements would be made by men accustomed to road-work and therefore skilled; materials for roads, gravel, timber, etc., could be chosen and prepared under one man to better advantage than as now; the work would be done with a view to permanency, and the principles of roadmaking more closely followed.

The first principle applicable to all the roads in this Province, is good drainage. "Take the water out and keep the water out" is a rule which must be followed in the making of every road. It is not enough to dig trenches at the side of the road and call them drains. These trenches must be real drains; that is they must have a good fall to a clear outlet, and be in every respect capable of carrying the water away. The road must be rounded up in the centre so as to shed the water quickly to the side drains. There must be a track in the centre of the road along which travel can pass. This track must be hard and smooth so as to afford the least friction to travel, prevent ruts and at the same time permit water to run off the sides quickly. Ruts and holes must not be permitted to form but must be filled up as soon as they appear. The drainage must not be abandoned with taking care of the surface water, but in many instances must extend below the surface in the form of tile underdrains, so as to maintain a firm foundation and lessen the destructive action of frost—injurious only to wet and water soaked roads. In addition to the simple work on roads, better methods with regard to bridge and culvert construction are greatly needed. The principles above enumerated with respect to roads require an infinity of special methods and treatments in arriving at the best results according as the land is high lying or low, is clay, sand, vegetable-mould, etc.; is difficult or easy of drainage; according to the extent of travel, the quality of road metal obtainable—these and many other varying conditions. That roadmaking and highway work of all kinds is considered a matter in which every man is proficient, is probably one of the evils underlying the bad condition of our roads to-day.

In the application of a few simple, fundamental principles lies the skill required in roadmaking as in other arts and sciences which are regarded as difficult. Roadmaking is an art, requiring much experience and skill.

Good roads bring prosperity, and prosperity brings good roads; they go hand in hand, each assisting the other. A recent writer has said that Spain would not have lost Cuba if she had joined the good roads movement. Far-fetched as the assertion may seem, it contains the element of truth. In spite of a long Spanish sovereignty, the common highways of Cuba, most fertile island of the Atlantic, are still of the most wretched description. Barbaric Spain has not yet learned what Rome knew one thousand years ago, what England well knows to-day, that roads are the arteries of commerce along which flows the life stream of a nation, bearing success, civilization and contentment to the inhabitants. The value of good roads to a community, as to a nation, cannot be overestimated.

SHOULD THE TOWNS ASSIST?

A difficulty in the way of obtaining better roads in Ontario, is that, under the present system of township management, the entire cost of road building falls upon the farmers. The people of the villages, towns and cities, to whom country roads are as necessary as to the farmers, and who compose nearly one-half of the population, pay nothing towards their construction or maintenance.

While it is necessary that the farmer should have roads to haul his produce to the centres of population, he also uses the roads to draw back to the farm the supplies purchased in the towns. It merely happens, as a matter of convenience easily understood, that the farmer draws his produce to the town and his purchases back to the farm instead of the merchant hauling his merchandise to the farmer, and the produce of the farm back to the town.

It is only a century or so ago since the active settlement of Ontario commenced. It was at that time the statute labor system was established. In addition to this, the Provincial Government spent the greater part of its revenue on the construction of roads and bridges. Since that time the distribution of the population has materially changed; the statute labor system remains for the construction of country roads, applying only to the rural districts, while the provincial aid has been withdrawn, thus wholly relieving the people of the towns and cities from their share in the cost of road building.

The change of conditions has taken place so gradually that the evident disparity resulting has remained unnoticed. The system of road control and taxation has not grown and developed with the growth and development of the country. The result, so far as road control is concerned, is similar to a full grown man still wearing the clothes in which he went to school.

There does not appear to be any reason why the farmer and rural population should pay the entire cost of road building, any more than they should meet the entire cost of railway and canal construction. A system of good country roads is an expensive public work, in every way necessary for the development of a country, and so long as the farmer bears the entire burden, it is manifest that the desired end, good roads, will be difficult if not impossible to reach. In any event, the attempt to do so comprises an injustice.

The towns are asking for good country roads. They are beginning to realize how important for them it is to have free and uninterrupted communication with the surrounding country districts at all seasons of the year, and would no doubt be willing to pay a fair proportion of the cost in order that road improvement would progress more rapidly. This very interest which is being displayed, is the strongest evidence as to the mutual right of townsman and farmer to pay for the construction of a country road system.

The principle, since the inauguration of the good roads movement on this continent, has been recognized in a number of American states, such as Massachusetts, Connecticut, New Jersey, Rhode Island, Vermont and New York, by the establishment of systems of state aid, whereby the state funds, derived from the entire population, urban as well as rural, contribute to the cost of country road building. In all European countries national aid in one form or another is given, thus taxing the city and town population.

In England the county council has entire jurisdiction over the roads, and is aided by a grant from the national treasury. A county engineer is appointed, a salaried officer, whose sole duty is the supervision of road work. The county is divided into districts, and the detail of the road work is attended to by assistant engineers acting under the parishes. The money required for the maintenance of highways is obtained by a precept issued by the county council to the various parish councils demanding the amount expended on the roads of the parish. This amount is collected in the general parish (or township) taxes, levied on the assessment values of property. A system of county management has been extended to all parts of Scotland. The roads of Ireland are under a county engineer and several assistants, each of the latter having his own district, improvements being regulated by a grand jury presentment system.

French roads are national, departmental and communal; corresponding largely to state, county and township roads. The national roads radiate from Paris, extending to all the important cities and departments, and are under a special engineering department (department of bridges and roads) attached to the national government. The second and third classes, departmental and provincial roads, are in a general way under local authorities, but departmental roads are usually entrusted to the care of the national corps of engineers.

Germany has a magnificent system of turnpikes built and maintained by the national government. They are under the general management of a state road commissioner, while he is assisted by an extensive staff of road directors and inspectors. Other roads are known as "country roads," and are built and maintained by the several parishes through which they pass.

The highways of Austria are classified as state or Imperial roads, provincial roads, district roads, and community roads, according to the authority constructing and managing them. The cost of building and maintaining the Imperial roads is derived from the national funds, the cost of provincial roads from the provincial funds, district roads from district funds. A little of the cost of community roads is borne by the several communities interested, aided in certain cases from the district funds. For the Imperial and provincial roads the best of engineering skill is employed, while for immediate repairs, road keepers are at work constantly.

Italian roads are under the supervision of the Minister of Public Works, and are national, provincial, communal, or vicinal, according to the source from which taxes for construction and maintenance are derived.

The more important roads of Denmark are controlled by the county councils but are subject to the annual inspection of a state engineer: the roads of lesser importance are governed by the parish or township councils.

The main roads of Belgium, those routes running from one part of the kingdom to another are controlled and managed by the state: another class, provincial roads, are controlled by the province; a third class, communal roads, are controlled by the communal authorities. The construction of these roads is entrusted to a corps of engineers.

In the Netherlands, a network of roads, providing convenient travel from one part of the country to another, is maintained by the general Government: other roads are at the expense of the various provinces and communities benefited.

The federal government of Switzerland controls a few of the important roads, but in the main they are built and maintained by the cantonial government through whose territory they pass. The construction and repair of roads of lesser important pertains to the several townships through which they pass.

Spain, decayed and tottering, the vestiges of an ancient magnificence falling from her, has not joined the good roads movement; nor has Turkey, the home of barbarism. Russia, too, has been exceedingly backward in road-building, and as a result her extensive and rich dominions are still practically undeveloped.

The immense benefit conferred by good roads has practical illustration in many parts of Europe, where it is of unusual occurrence to see a load drawn by more than one horse. In these countries so excellent are the roads, that anyone owning a team of horses does not consider himself dependent upon the rail-

roads for transportation, as wagon loads of from three to six tons are frequently drawn several hundred miles in competition with railway rates. In these cases the roads are, of course, of the best possible construction, built and maintained under experienced engineering supervision, and are a skilful compromise between ease of grade and directness of route.

PETITION OF THE DUFFERIN COUNTY COUNCIL.

The following petition is intimately associated with the principle just discussed, state aid, and was presented to the Legislative Assembly of Ontario by the County Council of Dufferin.

To His Honor the Lieutenant-Governor in Council, and to the Members of the Legislative Assembly of the Province of Ontario :—

The petition of the Council of the County of Dufferin humbly sheweth :—

That an averaged organized and settled township of the Province of Ontario expends annually about $2,500 for the opening up, repairing and deviation of highways within its limits. That owing to the want of experience of those entrusted with the work, lack of sufficient funds and the absence of uniformity and system as to method, the public do not realize the benefits it is entitled to expect from so large an expenditure as $25,000 in ten years, as the condition of our highways in the fall and early spring, and the snow drifts in the winter amply testify. That the obstruction to, and sometimes absolute prohibition of traffic owing to the defective highways entail much annual inconvenience and loss to the farming, town and city communities, by reason among many others of the farmers being unable to team their products at a time when the highest prices obtain, and by reason also of them not being able without much inconvenience and loss, to keep up communication for other purposes, with those with whom they have business and social relations.

That, in the opinion of your petitioners, no more important duty can be undertaken, than that which will ensure speedy, safe and easy communication between the rurul districts and the towns and cities and between the farmers themselves at all times of the year. That it is the opinion of your petitioners, that uniformity and system in road construction on modern and enlightened principles, are necessary in order to obtain the maximum of advantage to be derived from so large an expenditure on roads.

That recently the Province of Ontario has established the office of Provincial Road Instructor ; and in the opinion of your petitioners, this uniformity and system in road building may best be obtained by the Instructor's supervision, in connection with county roads commissioners ; provided Provincial aid be obtained in the payment of such work.

That the support of education, the poor, the erection and maintenance of county buildings, roads and bridges, administration of the laws, fire protection, lighting, water services and many other municipal necessities already entail as great burden on the local municipalities as they can at present well bear without incurring other financial liabilities.

That many of the States of the adjoining Union have adopted the principles of state aid to highways, with ever increasing advantage.

Thus the small State of Massachusetts in 1895 expended the large sum of $600,000 in aid of this work. In New York State a bill recently became law to the effect that, on a petition to the county council, certain roads may be adopted as state roads. The petition is presented to the State Engineer and if it obtains his approval, he presents plans and specifications to the Legislature, and if approved by that body, fifty per cent. of the cost of construction is paid by the State.

In New Jersey the State pays three-tenths of the cost, the county six-tenths and the owners of the lands affected by the improvement, one-tenth.

In Connecticut any township may prepare plans and specifications and let the contract, under the supervision of the state commissioner, in which case one-third of the cost is paid by the state, one-third by the county, and one-third by the township.

In Rhode Island, California, Indiana and Kentucky, somewhat similar provisions exist, the principles running throughout all of them being, that the local municipalities prepare the plans, let the contracts under which the work is done, under the supervision of the state commissioner, on a uniform system so as to secure a permanent highway with the least expenditure, to which the states liberally contribute.

That, in the opinion of your petitioners, some method could be adopted by legislation by which the public may secure uniform and permanent highways, with protection from snow drifts, with the most economical expenditure of money, to be constructed under some general and competent supervision, in order that this Province may secure its full development and increase of population, and that it may not lag behind the States of the adjoining Union.

Your petitioners therefore pray That legislation may be adopted in order to accomplish the objects above indicated.

(Sgd.) John C. Reid,
Clerk of County of Dufferin.

(Sgd.) W. H. Hunter,
Warden of County of Dufferin.

A LESSON FROM SCOTLAND.

Everywhere in romantic, hilly Scotland good roads are to be found, and only those who have travelled over them know the great measure in which they add to the real merits of the rural districts. Not merely in the well populated districts are the roads good, but in the craggy, mountainous parts as well, where sheep-grazing is almost the only possible means of utilizing the lands. When any portion of these roads is out of repair, the traveller may know that one man at least is not doing the work for which he is paid.

In Scotland farmers do not work on the road, but spend their time where they can do so to better advantage—on the farm. The repairing of roads is let by contract and is under the supervision of an engineer or inspector, the inspector advertising for tenders on so many miles of road. It is then the duty of the contractor to see that the gutters are kept open and the water drawn off, particularly in the fall and spring of the year. Broken stone is furnished him and, with a one-horse cart, he draws this wherever needed for patching, filling up hollows and ruts as they form. In this way the roads are kept smooth as a floor, so smooth that very rarely in Scotland is a farm conveyance drawn by more than one horse.

Roughly estimating, the settled area of Ontario approximates the total area of Scotland, about 30,000 square miles, while, the population of Ontario is about one-half that of Scotland. At the time when statute labor was abolished in Scotland—nearly a century ago—the population was less than the present population of Ontario, being then only 1,800,000, while Ontario has now over 2,000,000 inhabitants. Ontario with respect to her highways is one hundred years behind Scotland, but is better able in wealth, population and experience to make rapid strides for their improvement. The seed of a better system and better methods is being scattered over the Province, and less than a quarter of a century should find us on equal footing in every respect with the older lands.

A COUNTY SYSTEM,

That every county municipality should undertake the management of its leading roads is very much to be desired in the interest of better roads. There are a number of good reasons for the introduction of such a system, which has been thoroughly tested for several years in the County of Hastings. During the past year it has been actively discussed in the Counties of Oxford, Wentworth and Victoria, and although decided action has not yet been taken, there is every reason to believe that, when better understood, the prejudice which at present exists in opposition to it, will cease to prevent its adoption.

Under county control a properly organized corps of men can be employed to build and repair roads. As at other employments they become experienced and do better work, and in the matter of repairs are ready to make them as soon as signs of wear appear.

By a county plan, uniformity in system and work will be secured throughout the various municipalities. Whereas under township control a diversity of plans is sure to be adopted.

In a county plan an experienced and properly qualified man could be employed to have constant supervision of the work, whereas under township control, each municipality cannot afford to pay the salary of such a man. Under every good system of government it is necessary to have responsibility centralized and defined, not divided and easily shifted from one to another, as it is now under the statute labor system.

Under county control machinery can be handled to better advantage as an experienced operator can be employed for each implement, and a better and more uniform class of work will be secured.

A township can manage its roads properly only by adopting a plan similar to that outlined under a county system. But by extending it over the county it becomes more cheaply operated.

A properly connected system of leading roads throughout the county will be obtained under a county system; whereas with each township working independently of those around it, this will be lost sight of.

There is no community of interest between the townships. In one township there is a certain leading road much travelled and well made and maintained. The adjoining municipality may for various reasons not consider the continuance of that road through it of so much importance as to warrant them in making an expenditure to benefit largely their neighbors who are obliged to travel over it.

If no greater expenditure is made upon the roads than at the present time, the rate will be reduced because most of the township expenditure is now placed on the leading roads; and the township will be relieved of these by a county

system. Under the county system the funds will be sufficiently concentrated to undertake durable work, and consequently these roads will be properly constructed and afterwards maintained at a less cost than at present.

A county road system equalizes the cost of maintaining leading roads. In every county within a certain radius of a market town, traffic constantly increases as the town is approached. The cost of construction and maintenance increases in proportion to the traffic. It is unfair to charge those living near the town with the cost of keeping the roads to support the traffic from a distance: so unfair as to cause discouragement and often withdraws support.

Property is very largely valued according to distance from the market, and the convenience with which the market can be reached. Property a long distance from the market is affected to a greater extent by the bad condition of the roads than is property very near the market. Good roads are therefore of greater value to townships a long distance from the market town than those in the immediate vicinity.

Under a county system proper road construction would be undertaken and the economic value of this work would be seen and appreciated by the people of the different townships. The well built roads would stand as object lessons, and would teach the better expenditure of the funds spent by the townships on the roads maintained by them.

STATUTE LABOR.

The demand for better roads has directed public attention to the merits and demerits of statute labor, and a general feeling in opposition to the system is accumulating and gathering strength, promising within a few years to make a radical change in the method of caring for roads.

Previous reports have dealt upon this aspect of the case to a considerable extent, so that it scarcely becomes necessary to again enter upon a detailed discussion.

The system, under certain conditions existing chiefly in pioneer districts, is doubtless one of the best which could have been adopted, and has done exceedingly good work. Provision has been made under the Municipal Act, however, for substituting more suitable methods where these conditions cease, as they have done in many localities.

For well populated districts, where more advanced principles of government should be applied, the system of statute labor is fundamentally weak from two main causes which bring in their train many abuses, and cause failure in the effort to improve the roads in a manner corresponding to increasing requirements. These causes are, first: That control is so scattered that no one can be held responsible for a proper expenditure of the labor and money devoted to roads:

And second: That the payment of a tax in labor is too vague and clumsy to meet modern conditions. Some pay the tax with honest work, while others, from various motives, do not.

From these two sources spring many important results; neglected roads, injustice to the men who do honest work, misappropriation of labor and money, and similar abuses.

Under present conditions, all responsibility is, in the first place, distributed among the members of the council; the council again distributes it among fifty or one hundred pathmasters. A considerable sum in the aggregate is annually spent by most townships in the way of money and statute labor, but so scattered is this, together with responsibility, that the people scarcely realize how large a sum is being spent; and when mis-spent and squandered as it generally is, there is no one whom they can call to account. The councillors can shift responsibility from one to another and then to the pathmasters. The latter have nothing to lose, and so can merely shrug their shoulders when any improper or careless expenditure comes to light. Divided responsibility is never a successful form of government.

There should be a public servant having a position similar to that of a clerk or treasurer, who can be held responsible for the proper disposition of money and labor applied to the roads. It is the only means of securing the most beneficial and economical expenditure. The position must be made a desirable one, both from the fees and honor attached, in order that the best men may be secured, and in order that they will be sufficiently anxious to retain the office to give their best services in planning and supervising the work.

The number of enquiries received by the Roads Branch, respecting methods of replacing statute labor is constantly increasing, and strongly indicates a trend of public feeling which will shortly operate throughout the Province generally in remedying the present weaknesses—weaknesses which exist merely because the attention of the public has not heretofore been directed towards the necessity of reform. A communication received from the Clerk of Minto Township, Wellington County, together with the reply thereto, will afford an illustration of the feeling in this respect, and the reforms recommended.

Harriston, Nov. 14th, 1898.

A. W. Campbell, Esq.,
Provincial Instructor in Road-Making, Toronto.

Dear Sir,—We propose submitting a by-law to be voted on by the ratepayers of the Township of Minto at the next municipal elections for the abolition of statute labor, and as several methods have been talked of to replace it, I take the liberty of asking you to give us your views as to the best methods to be adopted.

The number of days statute labor in our township for the past year was 3,508 and it is proposed to levy a rate sufficient to raise an amount equal to about 50 cents per day, or say, $1,750, to be expended in road improvements in addition to what is now spent, which is about $1,100 exclusive of bridges.

What we would like your opinion about is the proper method of expending the money. Should it be expended by the Councillors, each acting as Commissioner for his own division; or would it be better to place it in the hands of one Commissioner, or several, not members of the Council; or should it be apportioned to the pathmasters to be expended in their several divisions?

I may mention that there appears to be the greatest opposition to the by-law on the grounds that the present system is good enough, that by the new system the work would not be so evenly distributed and that too much money would be appropriated for commissions.

From the extensive knowledge you have in all matters relating to road making and from a desire of our Council to put the matter in a practical light before the electors before having it voted on, we considered it highly desirable to obtain your opinion on the matter. Any further suggestions outside of what I have indicated in this letter will be fully appreciated.

Yours respectfully,

[Sgd.] W. D. McLellan,
Clerk of Minto.

Toronto, November 17th, 1898.

W. D. McLellan, Esq.,
Clerk of the Township of Minto, Harriston, Ont.

Sir,—I am very glad to see that your council has taken the progressive step of submitting a by-law to the ratepayers, at the next municipal election, for the abolition of statute labor.

I think, wherever this move is undertaken, the same opposition which you mention is made, viz., that the money will not be evenly distributed throughout the township, as the work is at present. The chief weakness of the statute labor system is the very fact that the labor is so distributed or scattered that in no section can durable or substantial work be undertaken for the want of a sufficient amount of labor. If the labor could be concentrated and faithful service performed along a well defined plan, good results would be produced. But this would be impossible. The money can be distributed in the same way by returning to each pathmaster the amount collected in his beat: but this would be only a very slight improvement, as experienced by the township of Winchester, where, upon making the change, this plan was adopted.

To reach successful results, the expenditure must be concentrated. All of your roads cannot be improved in one year nor a few years, but the whole of your roads should be planned, the township divided into sections, and the money in each section spent in a methodical way by commencing on the more important roads at one or more important points in each section, as your council may decide, finishing any work undertaken in accordance with your general plan and extending this work from year to year until the whole is finished. Every man

in the section or ward cannot be benefited by the first year's expenditure, but under a well defined system, each year's expenditure will bring the improvement closer to him, until finally each ratepayer is served. It would be necessary to strive to raise your people above jealousies and prejudice, and, in the interest of the township, look beyond the present to the improvement a few years will produce.

Your proposal to raise the money by levying a rate equal to about fifty cents a day is right. This added to the $1,100 will make a fund which, if judiciously expended, will in a short time work a wonderful improvement on your roads without incurring an excessive tax. I would suggest dividing the township into four sections of about equal area. In apportioning the expenditure to the different sections, the road mileage, extent and character of the travel, accessibility of the gravel or other road material, and the nature of the land surface, whether hilly or comparatively level, should be taken into account.

The division of the township into four sections will insure the ratepayers a fair distribution of the money to each part of the township. I favor the appointment and continuing in office of one commissioner to have charge of the expenditure on all roads and bridges, as well as the care and operation of all road-making machinery; such commissioner of course being an officer of the corporation and a servant of the council. He should report to the council with any recommendations before any work is done, and should proceed with the work only when authorized to do so by the council. Payment for all work should be made only upon the certificate of the commissioner.

As far as practicable, the council should prepare a plan and specification, classifying the roads according to their importance, and should specify width of grade, amount of crown, width and depth of gravel or broken stone to be placed on each, in order to secure, as far as possible, uniformity in work.

The commissioner should be a man of some municipal experience, familiar with the township, with some practical knowledge of handling men and directing work, as far as possible independent of outside influence, and who has sufficient interest in the township to secure his continuance in the position.

He need devote only such portion of his time to the duties of his office as the council may think necessary, but should be free at any time in the spring, fall or winter to make inspections and have such work done as may be needed during these seasons, or made necessary by snow storms, freshets or other emergency.

Such a man can be found in each township, but great care should be taken in his selection, as the success of the whole system depends on him. He need not be an expensive man, as his employment should be by the day, and as a general thing not more than six or eight weeks per year of his time is required. A fair rate, including horse and buggy, is $2.00 per day.

In the spring of the year the commissioner and the council should make an examination of the roads proposed to be improved, bridges, culverts, etc., and then decide what work is to be done.

Specifications should then be prepared, and as far as possible all works of construction, such as hauling gravel, digging drains, building bridges and culverts, cutting hills, should be let by public competition. Contracts should be entered into and security given. All grading should be done by a grading machine, which is the cheapest, simplest and most economical way of doing the work properly and expeditiously. This machine should be owned by the township, and operated where directed by the commissioner, the commissioner being given authority to employ whatever teams and men are needed.

The same teams and men, as far as possible, should be retained during the season's work, as they thereby become proficient and produce better results. The time for doing this grading should be in the early part of the season before the roads become baked and hard. There are many minor details of the work which the commissioner will regulate after a little experience, and which will be of great service in improving the roads; and a year's experience will show that the expenditure which you contemplate, made in this way, will do a surprisingly great amount of work, and will indicate to your citizens that system and method are what is required to make good roads in your township in a reasonable space of time, without increasing the present taxation for this purpose.

The chief objection to appointing councillors as commissioners is that a change of council means a change of commissioners and a consequent change of methods and ideas of doing work.

Besides, there is the influence which ratepayers are ever willing to exert upon their representative to secure favors, and which experienced councillors know will seriously tend to cripple the very object which your proposed change is intended to accomplish, viz., concentration of expenditure.

The sphere of a council is administrative merely, and the execution of the work should be through independent agents.

The commissioner will relieve councillors from a good deal of worry and humiliation, consequent upon carrying out such works. In one commissioner for the township you have an official whose continuance in office would be similar to that of a clerk or treasurer whose duties are fixed by by-law, and costing no more than a commissioner in each division.

I have recently received a letter from the clerk of N. Monaghan, in which township a commissioner is appointed in each district, but this plan they do not appear to favor and are now making an effort to place the work in the hands of one commissioner.

In fact I think the letter may be of some information to your council, and have taken the liberty of sending you a copy.

This is a matter which should be clearly placed before your people prior to the day of voting, as unfortunately in many municipalities the change is not made simply because the ratepayers do not understand, before voting, the effect the change will produce. Had this plan been adopted ten years ago, with the liberal expenditure you are making (say $28,000, or its equivalent, expended on such a system) I think the greatest opponent of reform must admit that the results in your township would be vastly better.

Should you require fuller information on any point connected with the proposed plan I would be very glad to discuss it with you, or if your council think I can be of any assistance in discussing the matter with the ratepayers I would willingly address any meetings you may arrange for that purpose.

Trusting to hear from you again with reference to the matter,

I remain, yours truly,

(Sgd.) A. W. Campbell,
Provincial Instructor in Road-Making.

ROAD REFORM IN OUTLINE.

The following is an outline, in brief, of a system of road control which a great many townships in Ontario could consider with profit.

Do away with the statute labor roll entirely.

To raise the money required, levy a rate on the assessment of the township.

For road purposes, divide the township into a convenient number of divisions, usually four.

Apportion the money equally among the road divisions, keeping in view all circumstances, viz: Importance of roads, works needed on them, benefit resulting to the greatest number of people, amount of traffic, assessment, etc.

Appoint one township road commissioner to advise and consult with, and carry out the direction of the council.

The office of road commissioner should be similar to that of the township clerk or treasurer.

Councillors should not act as commissioners, as they are subject to undue influence from the ratepayers, and their term of office is uncertain.

A general plan for road improvement should be laid down by the council for the commissioner to follow.

This plan should specify the width to be graded, width and depth of road metal, character of drainage, etc., of all roads.

Roads of importance should not be less than twenty-four feet between the inside edges of the open ditches. No road should be of less width than eighteen feet.

Early in the year the council and the commissioner should go over all the roads to consider the work to be undertaken.

Work of construction, such as hauling gravel, ditching, and drainage, building of bridges and culverts should be done by contract, and supervised by the road commissioner.

No account for labor or material should be paid by the treasurer except on the certificate of the road commissioner.

Minor work and repairing should be done by day labor, only the road commissioner being authorized to employ, direct or discharge men or teams.

All roadmaking machines should be in the care of the road commissioner.

Only the road commissioner should employ, direct or discharge the men or teams needed to operate the machinery.

Should the council desire to interfere in any of these matters they can do so through the commissioner.

The same man and teams should be hired to operate the machinery for the entire season, or longer if posssible, as they become proficient and do better work. This applies particularly to the operation of a road grader.

The commissioner should keep a pay roll to return quarterly to the council showing who have been paid and the amount paid, the roll to be then filed for auditors.

This roll will act as a check on favouritism on the part of the commissioner. Work should be divided as much as possible among the residents of the township desiring it.

Work should be commenced with a definite end in view and continued systematically, from year to year if necessary, until the entire road mileage has been brought to a proper standard.

NORTH MONAGHAN - STATUTE LABOR ABOLISHED.

Enquiry made of the Clerk of the Township of North Monaghan, Peterborough County, elicited the following reply from Mr. G. W. Bennett, Clerk of the Township.

DEAR SIR,—In reply to yours, 31st August, I beg to state: North Monaghan, is a small township, about 13,871 acres with an assessed value of $611,750, with between 35 and 40 miles of roads—a large proportion of which are earth roads. Situated as we are, adjacent to the town of Peterborough, a large number of our ratepayers are gardeners, butchers, milkmen, etc. In fact a majority of our ratepayers attend the market more or less three or four times a week all the year around. It can easily be seen how important it is to have the roads in a first-class condition, more especially as prices for produce usually incline upwards during the season of bad roads.

Our system now is commutation of our total labor, about 1,150 days, at 50c. a day. This is levied and collected as ordinary rates.

Our township is divided as equally as circumstances will admit into four districts, in each of which a commissioner appointed by the council has entire supervision.

As soon as possible after Court of Revision, I, as clerk, make a list of all parties in each division liable to pay the tax and amount of the same. Each commissioner is supplied with the list for his division, this for the purpose of making as equitable a distribution of the money as conditions will admit. This money is entirely expended in gravelling, *i.e.*, hauling gravel and metal from pits, some of which are private and belong to the township, and dumping upon such portion of the roads as are graded and water-tabled to receive the same.

The gravel from private pits costs us ten cents per yard, that from the township pits infinitely less, so much so, in fact, that no township should have, if possible, to pay for road metal by the yard. Our commissioners find it a great advantage to use a rooter plough in the pits to facilitate filling, and from township pits they can select such material as best serves their purposes on the different kinds of roads.

In addition to the commutation tax, each year, in our estimates there is an appropriation made for gravel, grading and grants, *i.e.*, to operate a road grader,

one of which we have purchased, and grants on boundary lines where we are required to give an equivalent for maintenance, and for repair and reconstruction of culverts and bridges, of which we have a large number.

All these works are directly under the supervision of the commissioners, as such occur within their respective divisions. All gravel is paid for on the certificate of commissioner who receives blank forms for that purpose.

Our council at an early date each year go over each district in company with the commissioner and suggest and lay out work to be undertaken during the year.

The method of letting jobs by auction tender also, is frequently adopted in cases requiring a larger expenditure than ordinary. This plan has been adopted, I may say, to facilitate the distribution of money as much as possible. In each case the contract is subject to the inspection of the commissioner in whose division the job is let, who reports on the same to the council.

Previous to this year we had a permanent gang of three men and two teams on the road grader who were controlled by the council. This method was discarded this year as it was found too much grading was done for the amount of gravelling, and time, too, was wasted going about from place to place at the dictation of any member of the council.

We this year only employ an operator, who has become an expert by practice, and is under the direction of the commissioner when required by him, who supplies teams and uses the grader when and where he can do so to the greatest advantage, observing to do no more grading than can be well metalled in any one year. I may here say that out of twelve scrapers belonging to the municipality previous to the purchase of a grader we can only get track of three, so little are they called for.

Our Council have a fixed rate of pay for all purposes, as follows :—

Commissioner	$1 50	per day.
Operator on grader	1 25	"
Breaking stone or filling	1 00	"
Man and team for any purpose	2 50	"

Each Commissioner is supplied with pay sheets and a time book which he is required to fill up, and as soon as required, the Council provide sufficient money which is paid to the order of each Commissioner who distributes it according to his pay sheet. This pay sheet when properly signed and certified is returned and examined by the Council, then if correct is filed for the Auditors, or for future reference. This examination by the Council is a check upon anything like favoritism on the part of a Commissioner.

This year our appropriations were as follows:—

Commutation of statute labor for gravelling	$550 00
Road grader operator	50 00
Bridges and culverts	400 00
Grants and miscellaneous	100 00
	$1,100 00

I may say that for 1898 I have not the complete returns from the Commissioners as to amount of work done, but for 1897—which would be about the

same—there was about 8¼ miles of highway graded and water-tabled at a cost of about $34 per mile. A considerable portion of this will require the grader over it again as it was found that during the wet weather in spring and fall the "narrow tire" cut into the grade, making ruts This year there was much less grading done and also at a reduction in the cost. In 1897 there were 2,083 yards of road metal, gravel, etc., drawn at an average cost, laid on the road, of 40 cents per yard.

There are other matters connected with our efforts to secure better roads, but I find this becoming too lengthy. However, although this may not be the best method of road construction one thing is certain, there is not a man of any importance in this township who would go back to the old statute labor way. There are a few kickers whom the Commissioners gave the go-by as not worth their salt. I find from direct communication with both Council and Commissioners, as well as a thorough knowledge of the condition of our roads, that until 1896 there was little or no work done in this municipality with a view of permanency. Now I find stretches of roads all over the township that will compare favorably with almost any street in the Town of Peterborough, where they have procured modern road-making machinery and approved methods.

Another thing, at a meeting of the Council last week attention was drawn distinctly to the fact that amongst other improvements none have stood out so prominently as that of employing two first-class men at the dumps when gravelling, supplied with a shovel and two stone hammers. Another important observation I can make.

The Commissioner having control of the work can and does insist upon a uniform box on each wagon with a result that, almost without exception, all the old boxes that were good enough for statute labor have now been discarded and new dump boxes of uniform depth and length have taken their place. This is important in many ways: not only does the township get the full value for their money in material, but each man draws an equal share, and it facilitates the evenness of the gravel when dumped upon the road.

There is an agitation on foot now in our Council to have *one capable Commissioner* over the entire township, and if it is possible to cut loose from the patronage which these appointments give each Councillor and appoint one good man who can employ foremen when desirable, they think it would be a still greater improvement.

Our Council are divided upon the commutation method. Some hold the view, and I endorse it, that the abolition of statute labor and commutation entirely, levying a general rate sufficient to meet the appropriation as found necessary after the annual inspection—in the spring—would be a better way.

In conclusion I might say we hope to have it within our means to acquire a road roller and crusher, and also to see a "wide tire law" within a few years.

I have the honor to be, Sir.

Yours truly,

[Sgd.] GEORGE W. BENNETT,

Peterborough, 24th September, 1898. Clerk of North Monaghan.

PREPARING FOR ROAD WORK.

Statute labor is about to commence in the various municipalities throughout the Province, and pathmasters and councils, if they have not already done so, should at once give the matter their most careful study. The improvements to be made with this year's expenditure of labor and money should be thoroughly looked into, and plans prepared, so that no time may be lost when the men are on the ground ; and so that the best ways and means will have been discovered. It is the neglect to exercise this forethought that causes the waste of a great portion of the labor and expenditure applied to the roads. Every step in the work should be carefully thought over by the pathmaster, and if there is a capable road commissioner, or general township supervisor with whom he can consult, and to whom he can apply for advice, so much the more prospect is there that work will be performed well and economically.

If a section of road is to be overhauled and constructed the pathmaster should know where, and to what extent, under-drainage is needed ; he should know what culverts are needed, he should know what amount of grading is needed, and he should know where to commence, and in what order the various parts of the work should be undertaken ; and he should know how many days of labor, what materials and what tools or machinery are needed in each successive step. All lumber, tile, or other material required should be purchased in advance and should be on the ground when needed.

More than knowing what tools are needed, the pathmaster should take proper steps to see that they will be furnished. Otherwise there will be too many wagons and not a scraper to be had, too many with shovels and not enough with teams, half a dozen plows and no shovels. Any implements owned by the municipality should be looked after early in the season to see that they are in proper repair.

In notifying those by whom statute labor is to be performed, only such a number as can be properly directed by the pathmaster and used to the best advantage on the work should be called out for one time. To call the men out without reference to the needs of the work is either an evidence of mismanagement on the part of the pathmaster, or if it cannot be done, is generally an indication that the statute labor of the district is of very little value.

Gravel pits should be attended to before the material is hauled to the road. They should be stripped of the layer of earth which generally covers them, so as to avoid delay when the teams are in the pit ; or if this is neglected, the probability is that the dirt will be permitted to fall into the pit, mix with the gravel, and be placed on the road, producing injury rather than benefit. If the gravel needs screening or crushing before being placed on the road, this should not be

left until the teams are in the pit, but is a matter for which money appropriation should be made, as statute labor can be utilized to best advantage in hauling the gravel.

DIRECTIONS FOR PATHMASTERS.

The following directions contain in brief the elemental principles which should be followed in the construction of a country road. They are adapted to the statute labor system, and to the means and conditions which prevail in townships where more radical reform has not been undertaken. Councils in the majority of cases would obtain better results from their statute labor by distributing freely among the ratepayers, prior to the time of performing road work, copies of such a list of instructions.

1. Every good road has two essential features:

(*a*) A thoroughly dry foundation.

(*b*) A smooth, hard, waterproof surface covering.

2. The foundation is the natural sub-soil, "the dirt road," which must be kept dry by good drainage.

3. The surface covering is generally a coating of gravel or broken stone, which should be put on the road in such a way that it will not, in wet weather, be churned up and mixed with the earth beneath. That is, it should form a distinct coating.

4. To accomplish this:

(*a*) The gravel or stone should contain very little sand or clay—it should be clean.

(*b*) The road should be crowned or rounded in the centre so as to shed the water to the open drains.

(*c*) Ruts should not be allowed to form as they prevent water passing to the open drains.

(*d*) The open drains should have a sufficient fall, and free outlet so that the water will not stand in them but will be carried away immediately.

(*e*) Tile under drains should be laid wherever the open drains are not sufficient and where the ground has a moist or wet appearance, with a tendency to absorb the gravel and rut readily. By this means the foundation is made dry.

5. Do not leave the gravel or stone just as it drops from the wagon, but spread it so that travel will at once pass over and consolidate it before the fall rains commence.

6. Keep the road metal raked or scraped into the wheel or horse tracks until consolidated.

7. Grade and crown the road before putting on gravel or stone.

8. If a grading machine is available, grade the roads which you intend to gravel before the time of statute labor, and use the statute labor as far as possible in drawing gravel.

9. A fair crown for gravel roads on level ground is one inch of rise to each foot of width from the side to the centre.

10. The road on hills should have a greater crown than on level ground, otherwise the water will follow the wheel tracks and create deep ruts instead of passing to the side drains. One and one-quarter inches to the foot from the side to centre will be sufficient.

11. Repair old gravel roads which have a hard centre but too little crown, and which have high square shoulders, by cutting off the shoulders, turning the material outward and placing new gravel or stone in the centre. Do not cover the old gravel foundation with the mixture of earth, sod and fine gravel of which the shoulders are composed. The shoulders can be most easily cut off by means of a grading machine.

12. A width of twenty-four feet between ditches will meet most conditions, with the central eight feet gravelled.

13. Wherever water stands on the roadway or by the roadside, or wherever the ground remains moist or is swampy in the spring and fall, better drainage is needed.

14. Look over the road under your charge after heavy rains and during spring freshets. The work of a few minutes in freeing drains from obstruction or diverting a current of water into a proper channel may become the work of days if neglected.

15. Surface water should be disposed of in small quantities; great accumulations are hard to handle and are destructive. Obtain outlets into natural watercourses as often as possible.

16. Instead of having deep open ditches to underdrain the road and dry the foundation, use tile.

17. Give culverts a good fall and free outlets so that water will not freeze in them.

18. In taking gravel from the pit, see that precautions are taken to draw only clean material. Do not let the face of the pit be scraped down, mixing clay, sand and turf with good gravel. There is a tendency to draw dirty gravel as it is the easiest to handle.

19. Gravel which retains a perpendicular face in the pit in the spring, and shows no trace of slipping, is generally fit for use on the road without treatment. Dirty gravel should be screened.

20. Plan and lay out the work before calling out the men.

21. When preparing plans keep the work of succeeding years in view.

22. Call out for each day only such a number of men and teams as can be properly directed.

23. In laying out the work estimate on a full day's work from each man and see that it is performed. Specity the number of loads of gravel to constitute a day's word. Every wagon box should hold a quarter of a cord.

24. Make early arrangements for having on the ground when required, and in good repair, all implements and tools to be used in the performance of statute labor.

25. Do all work with a view to permanence and durability.

THE BEST USE OF STATUTE LABOR.

Experience, wherever statute labor has been employed, has shown that it can usually be made most productive of good when used in teaming. Without a great deal of friction, wagon boxes of a fair size can be insisted upon, and honest loads drawn. Appropriations from the general funds should be so directed as to utilize as much of the statute labor as possible in this way; they should provide for the preparation of road metal; that is, the crushing of stone or the screening of gravel, or whatever preliminary treatment is needed to provide a good metal. It is better that a grading machine should be used on the road some little time before the gravel or broken stone is applied, and this is a matter which can be profitably attended to by the council. Draining, or a major part of it, and the construction of culverts are details which should be looked after, independently of statute labor. Townships which can anticipate statute labor by preparing the gravel, grading the roads with improved machinery, and constructing culverts and drains out of the general funds, using the statute labor in loading the wagons, teaming and spreading the metal on the roads, will obtain the most satisfactory results.

GRAVEL.

Councils very commonly give but little consideration to the matter of procuring gravel for use on the roads. Pathmasters are authorized to obtain gravel from a certain pit. It is paid for by the load, and the teamster performing statute labor is left to decide the size of the load and quality of the gravel. In the performance of statute labor horses are treated very mercifully, the smallest and oldest wagon is used, the laborer is "working for the Queen," and the result usually is that the owner of the pit obtains for half a load of boulders and turf, the price of a load of clean gravel. The only fair way to buy gravel is to purchase the pit outright. Test pits and borings can be made, and the quality and quantity of gravel obtainable estimated therefrom. Buying gravel by the

load is like buying water by the bucketful. Cases have occurred in which the money received for the gravel in a pit in the corner of a farm has amounted to enough to pay for the entire farm.

If the waste in this way ended with the extravagant amount paid for the gravel, the amount would be comparatively small. The great difficulty arises from the fact that the money that can be spent for gravel is limited to a certain amount. If only half a load is obtained for every full load paid for, only half the possible extent of road is gravelled and the roads suffer in consequence.

The gravel used should be clean, free from clay and sand, and if these are mixed with it in any quantity the gravel should be screened. If large stones or boulders are contained in the gravel it is a good plan to place a stone crusher in the pit and pass all the material through it. By having a rotary screen attached to the crusher the dirt and sand will be removed. Too much strees cannot be placed on the necessity for clean material. There is usually enough dirt on the road before the gravel is put on without going to the trouble of drawing it from the pit.

Some townships are wasting an enormous amount of gravel, and in a few years will have to face a serious difficulty—that of finding a substitute. There are townships now not far from that difficulty; which have for years been piling gravel on badly drained, badly graded, badly maintained roads. The immense hollows on many farms testify to the large amount of material which has been used, without forming in a single instance, a first class and durable road covering.

Gravel placed on a poorly drained, poorly graded road, the repair of which is not attended to at the proper time, is quickly rutted, and in the wet seasons of spring and fall, is mixed with the soil beneath, its usefulness as a road covering being thereby largely lost. But on the other hand, when the road is well drained, and graded, and the gravel is so laid upon it as to form a distinct coating, and ruts are repaired as rapidly as they form, the life of the gravel is very much extended.

There is a mile of road in a township of Western Ontario, which was first gravelled fifteen years ago, has had very little expended upon it since then in comparison with other roads in the vicinity, and is in splendid condition to-day

The road is on clay loam having moderately good natural drainage. The roadway was graded and the ordinary open drains provided at the sides. Gravel was placed in the centre, dropped from the wagons in the usual manner without spreading.

An old man who lived on the road, having little else to do, was employed by the pathmaster for a small amount to work on the road. He took an interest in his work, kept the drains open; year by year as a new line of gravel was added,

he spread it so that traffic at once passed over it instead of turning to the road-side, ruts were made in the loose material, but with a rake he brought the gravel back until the wheel tracks were like a line of steel rails, hard and solid.

This work was done fifteen years ago, but the road, as has been stated, is to-day the best in the township in spite of the fact that less gravel has been placed on it. A little extra labor has thus effected a saving of gravel, which if extended to the whole township would double the life of the gravel pits now being rapidly exhausted.

THE ESSENTIAL FEATURE OF A GOOD ROAD—DRAINAGE.

The essential feature of a good road is good drainage. This is true in all climates, but it becomes absolutely imperative in Canada where rains are heavy, at seasons almost continuous, and attended in the winter, autumn and spring seasons with severe frost, snow and slush. Every rule has its exception it is frequently said, but the maker of roads can safely follow the principle under all conditions, that drainage cannot be too perfect: that where drainage is perfect there is a perfect road.

On first sight this statement may seem exaggerated. The impression has so long existed that, if we get a surface of gravel or broken stone piled on a ridge of earth we have built a road, it is difficult to adjust our minds to other principles. No doubt working with this object, many fairly good roads have been produced, but they are, in a measure, the result of accident rather than reasonable and clear headed design. When roads are built with the fundamental purpose of doing so by securing perfect drainage we will be on the most direct and shortest route towards securing good roads. Much unnecessary labor and money will be saved, as well as much disappointment and dissatisfaction.

Doubtless the dweller in the country of sand will be inclined to think lightly of this advice, for he knows that, in wet weather, not too wet, his roads are at their best. He will be inclined, if he has never lived on clay lands, to think that advocacy of road building with such an object is a false doctrine. Yet even on sand lands the principle of good drainage is the principle of good roads.

An essential part of good drainage is to attend to the shape of the road surface. This must be crowned or rounded up towards the centre. The shape of the road will tend to throw off to the side, the water as it falls in rain, and the water of melting snow.

In addition to being crowned, the surface must be smooth; that is, free from ruts, wheel tracks, holes and hollows. If these exist on the surface of the road, instead of being thrown to the side the water is held back, is absorbed into the roadway which softens and yields readily to the wearing of the wheels. Like the water poured on a grindstone, so the water on a road surface assists the

grinding action of wheels. When the road is wet the holes and ruts rapidly increase in size, wagon after wagon sinks deeper, until finally the road becomes utterly bad and perhaps impassable as we so frequently find Canadian roads in late fall and early spring.

In order to provide for a smooth, round roadway, that will remain so in wet weather, it is necessary that the surface of the road be hardened with some stony material, and for this we use gravel and broken stone. By resisting wear, ruts and hollows do not form readily, or when commenced they do not increase with such great rapidity.

Having crowned the road and made it smooth, having placed on it a covering of metal to harden it, and assist in keeping it so, it is necessary to dispose of the water which flows from the travelled roadway to the open drains at the road side. These open drains must have an outlet to which the water flows readily and freely. Drains which have not a good fall and free outlet, which merely catch the water and hold it until it sinks into the earth, are of little service to the road. The reason for this points to another of the main features of good drainage.

That is, it is not sufficient that we crown the surface, make it hard and smooth, and carry away the surface water in open drains at the side of the road. It is absolutely necessary that the natural earth sub-soil which we crown and coat with stone shall be kept dry; for to keep the sub-soil dry is to keep it firm and strong to support the load. This metal, as we have said, resists wear; the natural earth underneath has to support not merely the load but the surface material as well. It is therefore, as previously pointed out, of prime importance that the water caught by the side drains shall be carried away immediately, before it can sink into, and soften the road foundation.

More than this, not merely must the surface water be carried away quickly, before it can sink into the soil, but underdrainage must frequently be resorted to. In many sandy and gravelly localities and even in clay districts, nature sometimes provides sufficient natural underdrainage, but more frequently we find low, wet sections where the water line must be lowered by means of tile drainage. A tile drain under each open drain is, in nearly every case, the best plan to pursue where underdrainage is needed.

The vast good which can be accomplished by means of tile underdrainage on the roads has been too long overlooked in Canada. Agriculturalists who have used tile underdrainage on farm lands, will be able to better understand its action on the roads. Just as there are lands which are useless for farming without underdrainage, so there are roads which are useless without underdrainage. A dry sub-soil can support any load. But with a wet and consequently weak sub-soil, the road metal is at once forced down and buried in the mud, while the mud

rises to the surface. And so, for want of a firm, dry foundation, the crown of the road is destroyed, the stone is mixed with the mud and the surface becomes soft and rough, easily worn, and surface drainage is thereby interfered with.

Here, then, we have, in brief, the principles of roadmaking, which resolve themselves essentially into a matter of good drainage. A smooth, hard, rounded surface throws the water to the side drains and the side drains carry it quickly away. The metal covering is both a roof and floor: a roof since it sheds the water to the side before being absorbed into the sub-soil beneath: a floor, in so far as it resists wear. The underdrainage of the roadway provides a firm, dry foundation, and so, in our structure, we have provided foundation, floor and roof, all by means of good drainage.

Sand, unless in a low section, seldom requires underdrainage, but with a good road covering of gravel or stone frequently makes the strongest of roads—so also with gravel. Clay is most frequently in need of underdrainage, particularly in low and swampy districts. But in every class of soil, at every season of the year, the water line should be kept three feet below the surface of the road. If nature does not do this, then artificial means, tile underdrainage, should be resorted to.

It is by means of good drainage that we provide against the action of frost on our roads. Frost can only be destructive where there is moisture. The upheaving action of frost on soil is caused by the presence of water. Water expands on freezing and forces the soil upwards; when thawing takes place the ground is left spongy and wet, and the roads "break up." Keep the roads dry and they will not break up. Our energies then, in the making of good roads, must be directed to the essential feature, good drainage.

When the road is kept dry by drainage the only care required is to see that the actual wear from the grinding of wheels and hammering of horses hoofs is repaired as it appears. This wear is but a trifle compared with the injury caused by wheels sinking into a wet and saturated subsoil.

By keeping in view the one principle "drainage," the reason for nearly all the steps in constructing and repairing a road at once becomes apparent, and work can be better adapted to all peculiar and unusual circumstances which arise.

One great lack in the present system of caring for roads is the little attention to repairs. Repairs should be made as soon as the signs of wear appear. Otherwise the defect grows with increasing rapidity; and what at first could have been entirely removed with a few minutes work, results in extensive and permanent damage. The reason is generally to be found under the head of "drainage." The track of a single wagon, scarcely perceptible at first, after a shower stands full of water and softens the road at that spot. A vehicle passing along at

such a time, sinks farther into the softened track. Here is a deeper hole to hold water: soon it becomes a rut, and the rut develops into a pitch-hole. The soil underneath is brought up and mixed with the surface covering. The surface covering is broken and forced down into the soil. Here then is a bad road and a permanent weakness, the result of neglect to repair the road at the proper time, neglect to keep the drainage of the road in perfect condition at all times.

THE ROAD GRADER.

During the past season in a large number of townships of Ontario, grading machines were used in improving the roads. That so many different methods of operating these machines should be employed, points strongly to the necessity of laying down a uniform system for regulating this important part of the work of road-making in order that the best results may be produced. A road grader is the most necessary implement for a township to possess, and in fact, some townships are so convinced of this as to have invested in four machines, placing one in each quarter of the township. The crowning of the roadway can be done very rapidly, cheaply and perfectly, by their use. To depend upon manual work for the first grading of roads, and the repair of others that require re-shaping, is a useless waste of labor and money. But these machines in the hands of inexperienced men, are often made to injure rather than improve the road.

The operator must know how a road should be made, and how the grader should be worked in order to make each road with the least expenditure. A study of the different methods employed, and a talk with the different operators, shows that the ideas are as varied as can be imagined; many of them are so ridiculous as to make one wonder why they should be tolerated by any municipal management.

In one township the machine is purchased by the council, placed at the disposal of any pathmaster who sees fit to take it from the railway people, and of any other pathmaster who cares to take it from one beat to another. These men may have then seen the machine for the first time and know nothing whatever about its mechanism or how it should be operated.

The directions specify the number of teams for ordinary soil. The horses are attached and if they do not provide sufficient power others are added. The blade is plunged into solid clay full tilt as if the whole object was to determine its strength or test the merits of the different teams engaged.

Each pathmaster is permitted to plan the work to suit his own ideas, and these usually differ from those of the pathmaster of the next beat. The width of grade differs from 15 to 45 feet in the same township, and sometimes in the same beat The amount of crown which should be given is, of course, arbitrary, and extends

from the flat and useless, to the ridiculous and dangerous. Roads are often graded higher where the crown is already sufficient, and occasionally the machine is used for ungrading a piece which is already properly made.

Another plan is for the council to hire the operator, the beats requiring his services to furnish the necessary teams, the work to be done according to the direction and dictation of the pathmaster, thus making the operator simply a part; the operator to be employed for the season's work only, and in fairness to others, the job must be passed around, so that he cannot expect to be hired for more than one season.

Sometimes the council employs the operator and one team, the beats using the machine to furnish the remaining team or teams. Where the township is divided into four wards or sections, one man and one team is sometimes employed in each ward so as to distribute the honors and patronage, these men to have charge of the machine in their respective wards. In townships more advanced in this work, the operator and two teams are employed by the council, he to appear when called on at any beat in the township even if he has to pass from one side of the township to the other. He is given no plan to follow, no directions, but is supposed to exercise his best judgment in the performance of the work; except where his judgment may conflict with the idea of the pathmaster, in which case the pathmaster rules.

Under all foregoing plans, no attempt is made at operating the machine during the early part of the season when the ground is in a fit condition, and when the work can be easily and properly performed; but the machine must remain idle awaiting the statute labor season when, as a general thing, especially in clay sections, the soil is baked so hard that perfect work cannot be done and it is unreasonable to expect satisfactory results. Often this work is commenced just when these roads are becoming serviceable and are ruined for the remainder of the summer. In such cases the investment is unprofitable, the labor is wasted, the roads are injured, farmers are deprived of services which are urgently required at this important season on the farm; and the benefits which would result from improvements upon the roads. if such labor was expended at a proper season and under suitable plans, is lost to the community.

The chief mistake in the use of a grader, and one which has caused a great deal of harm, is the covering of old gravel roads with the earth from the shoulders, in order to crown the road. This soft material at the edges of the road, clay, turf and washings from the road, is precisely what is not wanted on the travelled track. But this stuff is precisely what inexperienced men insist on putting on the road. These square shoulders are, of course, objectionable and should be cut off, as they interfere with drainage; but they should be thrown outward, across the ditch if necessary, and then the best gravel or stone obtainable should be used to crown the road and form the track. The reverse of this, rounding up

the roads with the material from the edges of the gravel roads has utterly destroyed many fairly good gravel roads. It appears almost necessary to let people destroy a few roads in order to show them what ought not to be done, and so convince them as to what should be done.

A proper plan to adopt would be as follows :—

1. Prepare a complete plan of the township, showing all road allowances, watercourses, bridges, etc.

2. Classify these roads according to their importance, dividing them into (*a*) main roads, (*b*) roads of moderate travel, (*c*) roads of least travel.

3. Prepare a proper specification fully describing the roads according to the above classification, setting forth the width of roadbed, plan of drainage, amount of crown, kind of material to be used as a covering, whether gravel or broken stone, depth and width to which it should be laid, how the material shall be prepared and applied, etc.

4. The grading machine should be owned by the township, one man should be employed to have charge of and operate the machine, and he should be a fixed resident of the municipality in order that his services may be retained for a number of years. He should be thoroughly practical and have some mechanical knowledge. He should be provided with a copy of the above specifications, and each spring, with a committee of the council, should examine the roads and determine the portion to be graded, as far as possible extending the work of previous years, securing continuity and uniformity in all work.

5. The operator should hire a sufficient number of teams to work the machine, and the same teams should always be employed in order that they may become accustomed to the work.

6. Where roads have already been gravelled, but the surface has become flattened by traffic and other causes, they should be carefully examined by the council, and all needed improvements can be then specified. As far as possible, the old gravel or stone roadbed should be preserved, and, except in cases where it is absolutely necessary to raise the grade, no earth should be placed upon it. But the shoulders should be cut off, turned outward and removed, and a new coating of metal applied to the centre of the road.

ROCK CRUSHERS.

Good roads and streets cannot be made perfectly and economically without the use of proper implements and machinery. In many municipalities gravel is scarce, and what is to be found is of very inferior quality, while stone for macadam can be easily and cheaply procured. In its natural condition the stone is useless

for streets, but properly broken, makes excellent material. For this work a rock crusher is required. Municipalities in Ontario are realizing this, and many have purchased complete outfits and are doing excellent work.

The cost of these crushers depends largely upon the capacity of the machine. The smallest make is usually chosen on account of its cheapness and without regard to the amount of work it will have to perform. The smallest machines are intended for township work, where they have to be constantly moved about and where the work at each point is not very great. With careful handling and not overcrowding, these machines, with necessary repairs, will answer for a number of years.

THE POPULAR IDEA OF ROAD-MAKING MACHINERY.

For city or town work, where a large quantity of material is required, it is a mistake to purchase a small crusher. The breaking of stones is a very severe test on machinery, owing to the varying character of the material; and ample capacity, so that the work can be done with perfect ease, is necessary. A crusher of ten cubic yards per hour run only at three-quarters its capacity, is the most serviceable and economical machine for most towns and cities. The extra cost incurred will prove a profitable outlay when the expense of maintenance and operation is considered.

There is frequently more than one way of doing a thing, but there is usually only one way which is the best way. To discover that one best way, even in doing so simple a thing as breaking stones for roads, generally requires some thought, knowledge and experience.

For example, some municipalities still cling to the oldtime method of breaking stone for roads, by the use of hammers and worn-out men who are pensioners on the municipality. There may be cases in which such a method is satisfactory, but they are very rare. Good labor is cheaper at any price.

In stone-breaking, there is no better laborer than a well-built, well-designed stone crusher. To operate the stone crusher, power is required however. Some municipalities, for this work, use an expensive steam roller attached to the crusher. The roller is made for one purpose, for compacting the metal in a road. To operate the motive machinery at so high a speed as is required for a stone crusher, to subject it to the jolting strains of a crusher, cannot but be very injurious to the roller. Of greater moment, perhaps, is the fact that the roller is unprotected from the dust created in crushing the stone, thereby causing great

wear. This illtreatment of an expensive roller will tend to destroy it very rapidly, the resulting depreciation being very great, varying, of course, according to the extent to which it is so used.

The cost of operating a steam roller for power (in addition to the deterioration of the roller), will cost about $2.50 per day for fuel, and $1.50 per day for an engineer.

Better than this is to purchase a separate engine which can be operated for about the same daily outlay $4. The value of the engine being much less than the steam roller, the resulting loss from depreciation is not so great. Some municipalities have purchased second hand engines which have been used on threshers, for $250 and $300, and which have rendered very efficient service.

The town of Berlin, however, has one of the most economical sources of power in the Province. An electric motor, receiving power from the local electric plant, does the work for $1.75 per day. The motor which cost $250, is a small piece of machinery, requiring little care other than oiling and "pushing the button," when power is to be turned on or off. The motor is of very simple design, is protected from dust and weather by a small wooden covering, so that loss from depreciation is very slight.

A number of the American States have in various ways experimented with the employment of convicts in road-building, New York, North Carolina, and California being perhaps the chief. There are objections to having the prisoners employed immediately upon the roads in such work as draining and grading, objections which the majority of Canadians will readily appreciate. There are few who desire to see, in public, anything resembling chain gangs, guarded by armed keepers.

The spectacle is a degrading one, and can result in no good to the prisoners. The law has no part in avenging crime, but in preventing it. To elevate the criminal is the righteous and highest aim of justice. To publicly humiliate can have no such influence.

There is, however, a manner of employing convicts, behind the prison walls, which will at once give them healthful employment, take them away from competition with honest labor, and result in benefit to the roads. This is in the preparation of road material. Milton, Cornwall, and we believe other county gaols already employ the prisoners in this way, the stone being conveyed to the gaol, and broken with stone hammers. Much more, however, could be accomplished if stone crushers were used, and the broken stone supplied free, if necessary, for use on country, as well as town roads.

Where stone or gravel for road metal is not readily available it can be frevently shipped a considerable distance by rail at a reasonable rate. Complete crushing plants are now operated and have been in operation for the past few years, at St. Davids, near Niagara Falls, and at Hagersville. Considerable material is

being supplied to different municipalities by these quarries. In western Ontario gravel and stone in many sections, is scarce, but a large crushing plant has been placed in the quarry at Amherstburg, from which an ample supply for all such sections may be obtained. The railway companies are all disposed to grant reduced rates to municipalities on material required for roadmaking.

It would be advisable for municipalities without road metal to obtain prices, and strive to divert as much as possible of their annual appropriation for the purpose of providing such material, leaving the statute labor or other expenditure for hauling and placing it. Many municipal councils consider this too expensive an undertaking, to even consider, but would be surprised to find, taking all things into consideration, how cheaply roads can be made in this way.

"A STEAM ROLLER AN ABSOLUTE NECESSITY."

The usefulness of a steam roller in the construction of broken stone roads, has been fully commented upon in previous reports. An article under the above title appeared recently in the 'Brantford Expositor,' fully corroborating from entirely independent sources, and in an entirely independent manner, all that has been urged with respect to steam rollers, and is most instructive. The article indicates, too, the widespread interest taken in street improvement, and is as follows:—

"The 'Expositor' makes no pretence of being a scientific expert in the matter of road-making, but is prepared to accept experience both in this, and in other lands, as determining that a steam road roller is an absolute necessity in the economical construction of macadam roads, and in their repair. This is abundantly demonstrated by the fact that in countries, and municipalities, where the best macadam roads are to be found, this appliance is always present.

"In our own Province of Ontario the movement in favor of good roads has been advancing rapidly, and simultaneously there has been a demand for proper machinery. The following cities and towns have purchased steam rollers:—

Toronto	London	Hamilton	Chatham	Stratford
Berlin	Galt	St. Catharines	Niagara Falls	Ottawa
Brockville	Woodstock	Owen Sound	Kingston	

Peterborough council has decided to make the purchase, and in St. Thomas a steam roller is owned by a contractor.

"The very fact that almost every Ontario municipality occupying a similar position to Brantford is in possession of this valuable aid to good roadmaking affords strong evidence that such an appliance is an absolute necessity for this city.

"The purchase of a steam roller was one of the strong recommendations made by Mr. Campbell, the Provincial Road Commissioner, in his report of the 30th October, 1897, on Brantford streets, and the same excellent authority in a letter to the editor of this paper of recent date says:

"SIR,—Your favor of the 11th inst., making enquiry as to the utility of steam rollers, was duly received.

"From the list which I sent you, you will see that Brantford is one of the few cities in Ontario which does not own or use a steam roller in the building and maintaining of streets, and, in fact, very few of the larger towns are without such an implement.

"I am satisfied that every municipality using a steam roller will unhesitatingly say that it is indispensable in the proper construction of streets. No one with any experience in street-building will assert that the work can be done with any degree of satisfaction without a roller.

"In building streets, as in any other class of work, proper implements are necessary to to secure perfect and economical results. Without a roller the practice is to excavate and grade the roadbed, then dump the gravel or broken stone on this soft foundation. The material not being compressed will yield to the wheels, rut, separate, and roll about. To prevent this in a degree, sand, cinders, or other foreign material is mixed with the stone and spread over its surface, to fill the voids and act as a 'binder.' This, however, is only temporary work, and lays the foundation for most expensive maintenance, besides proving a very unsatisfactory roadway.

"The sand, ashes, cinders, etc., placed on the surface grinds into dust in the dry weather and becomes unbearable if not constantly sprinkled, and this is difficult to do without converting it several times a day into a body of mud.

"The extra sprinkling is a considerable item of cost, and the mud created is very annoying to the users of carriages and bicycles, as well as being injurious to these vehicles.

"This foreign material in the body of the roadbed attracts moisture at wet seasons, turns into mud, and the bond between the stones is broken, causing them to yield to traffic and turn into ruts and holes. This mud churns to the surface and yields a very heavy crop every season, which must be scraped up and carried away.

"In a properly constructed road, after the excavation is done, and before any stone is placed upon it, the foundation should be rolled until perfectly solid. Upon this the broken stone is placed. This stone should be graded by the screen attached to the crusher into three different sizes, the coarsest being placed at the bottom of the road and the finest at the surface. In crushing the stone, a large quantity of fine stone dust is created, which is removed by the screen, and only this dust should be used for the binder, a sufficient amount of it to fill the voids being scattered over each layer of stone placed on the road and also on the surface.

"Each layer should be rolled sufficiently to set the stones in place, and after the final coating is put on, the rolling should be continued until every stone is firmly set and the mass perfectly consolidated. Each layer should be sprinkled with water before rolling so as to wash the stone dust into the crevices. In this way a road is made of proportionate thickness and uniform strength on an unyielding foundation, impervious to water, with a smooth, hard surface which will readily shed the water and distribute wear and traffic uniformly.

"It is the only way to construct a macadam road in the cheapest, most efficient and economical manner. It can at once be seen that this cannot be accomplished without the use of a heavy roller. For city work, such a roller should be about fifteen tons in weight.

"In constructing a macadam street, the stones are broken into cubical fragments and placed to such a depth as may be required to withstand the traffic. If this stone is dumped loosely on the road each stone lies separately, there is no proper union of the mass, and in wet weather the water passes through the stone as through a sieve, enters the foundation and converts it into mud. The traffic then settles the stone into the weakened foundation, forcing the mud through the voids to the surface.

"Whereas, where a roller is used, its repeated operation over the surface of the stone causes each cubical block to find its place among the cubes below it, forming a perfect combination, keeping them together and filling the voids. By the aid of sprinkling and pressure, the whole is cemented and forms a perfect sheet of clean material, almost equal to solid stone.

"For the sake of appearance and cleanliness the principal streets in the business part of Brantford should be paved with a more substantial material, such as brick or asphalt, but the standard pavement for Brantford, as well as other cities and towns in Ontario, should be properly

constructed broken stone roads. Your city now owns a crusher, but the usefulness of this valuable machine is largely lost for the want of its complement, the heavy roller. By providing this you will have made an important step towards the improvement of your streets.

"As the use of heavy rollers in street construction in Ontario is of recent date, it will be interesting for you to obtain, as you contemplate, the experience of other towns and cities using them."

"The *Expositor*, as Mr. Campbell indicates in his letter, did take steps to obtain the opinions from cities and towns which already own steam rollers, and in no instance was a reply unfavorable to their use obtained. On the contrary, all the authorities were in agreement that good roads could be obtained in no other way. We append the replies thus far received :

From C. H. Rust, City Engineer of Toronto :

"DEAR SIR,—In reply to your letter of the 11th inst., it is impossible to make a good macadam road without the use of a steam road roller, and, if the city of Brantford is building macadam roads, I know no better investment for their money than a steam road roller."

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From E. G. Barrow, City Engineer of Hamilton :

"DEAR SIR,—In answer to the question asked in yours of November 12th, I would say that our steam road roller has given very great satisfaction. It has been in constant use since we purchased it, and our macadam streets have been done far better and much cheaper than heretofore without the roller. In picking up rough macadam streets it has done as much work in a day as twenty-five or thirty men, and its use in rolling the foundations to receive the macadam is very great, making a compact bed. I cannot speak too highly of the work of the roller, and I can say with the utmost confidence that our city never spent money to better advantage."

———

From Robert Surtees, City Engineer of Ottawa :

"DEAR SIR,—In reply to yours of the 12th asking experience of this city with steam road roller, I beg to state that this city has had a fifteen-ton steam road roller for the past ten years, and consider it one of the best investments they have made. In my opinion it is impossible to make good macadam roads without using a ten or fifteen-ton steam roller, and prefer fifteen-ton."

———

From A. Ormsby Graydon, City Engineer of London :

"DEAR SIR,—In reply to your enquiry as to the benefit or otherwise to the city of having a steam roller for assisting to make good roads, I beg to say that it is not possible to make a good macadam road without one, and for ordinary gravel roads the roller is of immense value. In my opinion and experience no corporation making gravel or macadam roads can afford to do without one.

"I have had one in use for about three or four years and have found it of great advantage, in fact, for a portion of the year I would be glad to have two of them. The season is short in which you can use it, about six months, and we can hardly roll all the streets required to be rolled in that time, as there are 118⅔ miles of streets in the city."

———

From Jas. A. Bell, City Engineer of St. Thomas :

"DEAR SIR,—In answer to yours of the 12th, I beg to say that this city has no steam roller and has only used one under contract for laying brick pavement. All our other streets have been made with a five-ton horse roller, which is owned by the city. I may say that from experience much better work can be done at less cost by using a steam roller."

———

From W. Bolger, City Engineer of Kingston :

"DEAR SIR,—In reply to your letter of the 12th inst., I beg to state our steam road roller is considered the most convenient and useful article the city owns.

"The one we have has been in use for twelve years, and is now as good as ever. Your city would make no mistake in purchasing a road roller if you have much macadam streets. We would not be without one for any consideration."

From W. F. Van Buskirk, City Engineer of Stratford:

"DEAR SIR,—I have the honor to acknowledge receipt of your letter of the 12th inst., *re* experience with steam road roller.

"You will find a report on the matter written by me for Mr. Campbell, Provincial Instructor in Road Making, in his report for 1897.

"I am of the opinion that good macadam, gravel or earth roads cannot be made without a roller, but it should be borne in mind that a roller itself will not make good roads. It is like any other machine, requires skilled labor to operate properly, and intelligent management to secure the best results.

"The work done here on old gravel roads has been satisfactory, and has been done at a low cost. Old gravel roads have been torn up, regraded and thoroughly consolidated, making as good roads as could be made for four times the cost without the roller.

"A roller is necessary for the repair of roads, as new material can be so easily incorporated with that already in place.

"I was greatly amused at the ideas of the laborers at the time the roller was purchased here. They were of the opinion that the machine would not do the work that they had been doing, and opposed purchase for that reason.

"I consider a steam roller a necessity for any town doing road work by day labor. The question of weight necessary should be left to the engineer and not to the agents of the firms wishing to sell machines. The engineer will know what weight is best for the class of soil and material available, and as he will be held responsible for work done, let him choose the machine he wishes. This is important."

From George A. McMullen, Town Clerk of Brockville:

"DEAR SIR,—Replying to yours of 12th inst., would say that we have a fifteen-ton steam roller and would not be without it under any consideration. We now have street beds which are giving satisfaction in every way. I may also state that outside places such as Cornwall and Township of Elizabethtown have rented our roller with the result that they have decided on having rollers of their own.

"We purchased ours from Kelly Bros., Springfield, Ohio, U.S. (firm name the O. S. Kelly Co.). I understand, however, that steam road rollers can now be procured from Canadian agents at a less price than ours cost in 1894.

"Any further information you may require will be cheerfully given."

From J. M. Hood, Clerk of the Town of Galt:

"DEAR SIR,—Replying to your letter of 12th, the Town of Galt has a Buffalo Pitts Steam Road Roller, and it has been in use nearly all summer on our streets. It is the universal opinion that we have more to show for the money spent on our streets this year than for years before on the old tinkering plan. We have a stone crusher and all the other appliances for making good roads.

"We are especially well pleased with the roller. It is a fifteen-ton one, and in every particular fills the bill.

"Any further particulars will be pleased to give."

From John Robinson, Clerk of the Town of Niagara Falls:

"DEAR SIR,—In reply to yours of 12th, I have no hesitation in saying that the steam roller lately purchased by the town of Niagara Falls has materially contributed to the making of good streets. The steam roller was bought in the latter part of 1897 from the Buffalo Pitts Company and has given perfect satisfaction. This year the town bought a stone crusher, and with these two machines has made the road along the river front the best road we ever had in the town. After seeing the work of the roller and crusher I do not think there is a man in town who would consent to do without them."

From H. Aletter, Town Clerk of Berlin:

"In reply to your letter of 12th inst., I beg to say that how to make good permanent macadam roads without a roller is beyond our comprehension. We are just now using our roller on one of our leading streets, which street we constructed in manner following:

"(1) Lay four inches cobble stones.

"(2) Lay four inches coarse crushed stone.

"(3) Lay four inches fine crushed stone.

"(4) Lay one inch dressing (fine gravel).

"This street is partly finished and we are all of the opinion that we have an A1 street in every respect.

"We have nothing to show for the vast amount of money spent on our streets heretofore without the use of a roller.

"We have also been using our rollers on old worn-out streets by way of picking up and rolling down roadbeds with quite satisfactory results."

"The *Expositor* has withheld no letters it received in reply to its question: it has given every letter precisely as it was received. Such an emphatic endorsation of the use of the steam roller cannot be safely disregarded by any thinking elector, particularly by one who is anxious, as all should be, to see that proper return is secured for the money expended on our streets, and that the city in which we take so much pride shall fully deserve, in all respects, the claim we are continually making for it of being progressive and up-to-date. It is false economy to work with poor tools, and this applies to the making of corporation streets as it does to everything else. A steam roller will pay for itself many times over, and the investment cannot be made too soon.

"We are satisfied that if the ratepayers of Brantford had been seized of all the facts when they voted upon the steam roller last summer, the result would have been vastly different. It would probably have been different as it was, had not two other by-laws, one for a very large amount, been submitted at the same time, and thus created a certain amount of hesitancy lest expenditures were being pushed forward too rapidly. We are convinced at any rate that a mistake was made at that time which cannot be too soon corrected, and that it will pay the Council to borrow a steam roller rather than continue as we have been doing in the past. It is worth considering, indeed, if another by-law should not be submitted to the electors in January next, and we feel satisfied that if this be done the proposal will carry by a good majority."

THE WEIGHT OF THE ROAD ROLLER.

There are different kinds and classes of rollers. The horse roller weighing six or eight tons, will do fairly well if a steam roller cannot be afforded, but the horse roller is not sufficiently heavy and has to be used much longer on a given section than has a steam roller to produce the best results. The feet of the horses, in exerting sufficient strength to move the roller, sink into and disturb the road metal, and thereby injure the shape and quality of the roadway.

There is danger, on the other hand, of having a steam roller which is too heavy. A very heavy roller will sometimes sink into light or loose soil, force it ahead and create a mound over which it cannot pass; this, however, may sometimes be overcome by spreading over the surface of the soil being rolled, a thin

coating of gravel. The same result will sometimes occur with an excessively heavy roller on a layer of loose stone. The heavy roller is more liable, too, to injure underground pipes, catch-basins, culverts, bridges, or disturb sidewalks.

For these reasons a roller exceeding ten or twelve tons in weight, in some localities where the soil is of a loose or sandy nature, is frequently not desirable In districts where the natural soil is gravelly or of a stiff clay, a heavier roller may be operated successfully, but some municipalities have found it necessary to use a light horse roller in consolidating the sub-soil and first layers of stone.

Nor, if the stone used in the construction of macadam streets is of a soft nature, is a heavy roller say of twenty tons desirable even in the finishing courses, as the crushing effect has been found in some cases to crumble and pulverize the stone rather than merely consolidate it.

For new work, in which the dirt foundation must be rolled, a weight of twelve tons is generally the most serviceable ; but for picking up an old roadway and reconsolidating it or for finishing a new work, fifteen tons is better. Where a town is to own only one roller it will be advisable to consider very carefully the work to be done before purchasing a roller of over twelve tons weight.

REPAIRING WITH A ROLLER.

By proper attention and repairs the life of a broken stone pavement can be made continuous. The surface can be frequently rolled, improving it greatly. It can be scraped and swept as are other pavements. When it begins to lose shape the surface can be loosened up by means of teeth attached to the roller, a light coating of new metal applied, and then rolled down as well as when new. It is by such means as these that broken stone roadways can be made more economical and satisfactory than any other for streets generally. This ease of renewal and repair is a property peculiar to macadam, which renders it most suitable for general purposes—that is, for residence streets. While the cost in the first instance may nearly equal that of cedar block, yet at the termination of the period when cedar block is decayed and has to be torn up and renewed, the macadam, if properly treated, is still in good condition. It forms a permanent basis, and its perpetuation is merely a matter of repair to be met by the general funds. Except under excessive wear or where in business sections a high grade pavement is necessary, broken stone pavements, by the aid of a steam roller, are beyond doubt the most serviceable, economical, and give the greatest satisfaction to the taxpayer.

HIGHWAY CULVERTS AND BRIDGES.

The majority of Canadians, when visiting Europe, are impressed with the durability and solidity which characterizes the structures of that country. Private residences are built to withstand the wear of centuries. Cathedrals,

public halls, libraries, and similar civic institutions are constructed, not merely for the present, but for future generations. Among the works marked by this durability are to be classed the public highways with all that pertains to them. Canada in this regard, presents a very unfortunate contrast.

It can justly be argued that Canada is a very young country, and that England is a very old country; that Canada is not a wealthy country, and that England is a very wealthy country. While England is, in a way, a very old country, yet it is not so much older than this country in the arts of civilization, which should teach our citizens and municipal councils the necessity for and the means of wisely spending money in permanent improvements. And while England is a richer country than Canada, that greater degree of wealth has been brought about, to some extent, by the very durability which we have so long avoided. Permanent improvements are the cheapest. Structures which need props and repairs within a year or two after they have been built, seem to be in a chronic state of starvation, with a ravenous appetite for money. Canadians have not yet entirely outgrown the idea that they live in a pioneer land where the needs of the present entirely overwhelm the future.

In nothing is this temporary building more apparent than in our highways; and in no detail of our highways is it more striking than in the matter of bridges and culverts. At the same time there is no portion of the making of a road that offers more scope to the roadmaker than in providing substantial and permanent waterways. Instead of the handsome stone and concrete arches that span so many of the streams intersecting the highways of England, there are to-day in this country scores of wooden boxes and trusses,—flimsy, disjointed, unsafe; the constant source of accident, and the bottomless pit into which councils are annually throwing money in a vain endeavor to keep them in repair.

Location.

Considerable attention is generally paid to the selection of a good site for a bridge, and an effort is made to decide in the interest of economy, usually with a considerable measure of success. There is, however, a tendency to cling to the line of original survey, rather than deviate the road slightly, when by doing so, much would be gained in lessening the dimensions of the bridge, securing firm foundations for piers and abutments, reducing the cuts and fills at the approaches of the bridge; all of which, while they may not decrease materially the first cost, very frequently are of the utmost consequence with regard to maintenance, and may decide for good or bad the usefulness of the entire roadway. The utility of a road with respect to hauling heavy loads, is not governed so much by the condition of the best section as by the worst; not so much by the level portion as by the steepest grade. Bridges, forming as they do a means of crossing valleys, are intimately associated with the problem of judiciously choosing between directness of route, easy gradients and details of construction.

The location of culverts is a matter of very common error. Water should be disposed of in small quantities, along natural watercourses, before it gathers force and headway. Instead of this principle being followed, water is frequently carried long distances by the roadside, past watercourses after watercourse, rather than build a culvert or culverts to carry it away without injury to the road. Where culverts are needed, they should pass directly across the road and carry the water away from it.

The size of bridge or size of culvert involves nice discrimination, in which local circumstances and the class of construction introduce various factors. For the size of waterway, no hard and fast rule can be given. Many existing culverts and bridges were at one time of sufficient size, but the clearing, draining and cultivating of the land now permits the water after a rainfall to reach the watercourse in a shorter time with increased volume, causing submerged roadway and flooded roadsides, while culverts and bridges are swept away. The best guide to a proper size of waterway is an intimate acquaintance with the locality or the evidence of others who are, with respect to maximum rainfall, height of water line, previous experience as to floods, form and inclination of the stream and area to be drained, kind and condition of the soil and similar details. Talbot's Formula, proposed more as a guide to the judgment than as an unalterable rule is at times very useful:

Area of waterway in square feet $= C \sqrt[4]{(\text{Drainage area, in acres})^3}$. C is a variable co-efficient and the values given are:

"For steep and rocky ground, C varies from $\frac{2}{3}$ to 1. For rolling agricultural country subject to floods at times of melting snow, and with the length of valley three or four times its width, C is about $\frac{1}{3}$; and if the stream is longer in proportion to the area, decrease C. In districts not affected by accumulated snow and where the length of the valley is several times the width, $\frac{1}{5}$ or $\frac{1}{6}$, or even less, may be used. C should be increased for steep side slopes, especially if the upper part of the valley has a much greater fall than the channel at the culvert"

Waterways should be neither needlessly large, nor of too small dimensions, involving on the one hand unnecessary expense for first construction, and on the other hand, injury to the road, washouts, expensive repairs and delay to traffic.

Materials.

The materials available for culvert construction in addition to timber, are sewer pipe, concrete pipe, iron pipe, brick, stone and concrete. Culverts are sometimes made of one of these materials alone, or of two or more in combination. When the dimensions of a bridge are reached, concrete and stone abutments and piers, with iron or steel superstructure; or stone, brick or concrete, alone or in combination, are the materials gaining favor.

Sewer Pipe.

For the small culverts, sewer pipe is very economical and durable if well laid. To render them secure against the test of a Canadian climate, they should be laid with a good grade, and the ends protected with concrete, stone or brick headwalls having deep aprons. The joints should be made water tight with cement. These precautions will provide against the action of frost and will prevent the culvert being undermined by water passing along the outside of the pipe, either from the ends or through the joints. Care should be taken to excavate a concave bed for the pipe to rest in, always laying the spigot ends up grade.

The pipe at the outlet should be set flush with the surface of the ground. If set higher than the surface the fall of water will wash out a depression and will in time undermine the end of the culvert. A too rapid grade will cause the same result. It is frequently well to cobble-pave the outlet, where this undermining action is likely to occur.

Cement-Concrete Pipe.

Excellent culvert pipe of concrete can be manufactured cheaply in any gravel pit under the immediate direction of the municipal engineer. The pipes are from two to four inches in thickness according to diameter; which latter may safely and conveniently reach three feet, in lengths of two and one-half feet.

The implements required are of the simplest kind. The most important are two steel, spring cylinders, one to set inside the other, leaving a space between the two equal to the thickness of the finished concrete pipe. By "spring-cylinder" it may be explained, is meant such a cylinder as would be formed by rolling an iron plate into a tube without sealing the joint. With the smaller of these cylinders the edges overlap or coil slightly; but are so manufactured that the edges may be forced back and set into a perfect cylinder.

These two cylinders with joints flush are set on end, the one centrally inside the other and on a firm board bottom. The concrete, made of first-class cement and well screened gravel in the proportion of one of cement to three of gravel, is then tamped firmly but lightly into the space or mould between the two cylinders. The tamping-iron used to press the concrete into place is so shaped as to fit closely to the cylinders.

The concrete is allowed to stand in the mould for a few hours, when the cylinders are removed; the outer and larger cylinder by inserting an iron wedge into the joint, and forcing the edges apart; the inner cylinder, by inserting the wedge into the joint and turning the edges so as to allow them to again overlap, returning to the shape of a coil. The outer cylinder having thus been made larger and the inner one smaller, they can readily be taken away, and the concrete pipe is then left until thoroughly hardened.

Just such a number of pipe as are actually required for the season's work need be manufactured; the implements required are inexpensive, and the pipe

may be made by the municipality for actual cost, which, after a little experience, can be reduced to a very small amount. Culverts of concrete pipe are laid in a manner similar to those of sewer pipe.

Arch Culverts of Stone and Concrete.

There is no departure which would more enrich the highways than the general use of stone and concrete for the construction of bridges and culverts. They cost more in the first instance, but the longer life, the fewer repairs needed, the greater convenience, the lesser liability to accident, render them in every way desirable.

Concrete and stone are the only materials with which really permanent work of this nature can be constructed. Bridges and culverts of rubble masonry have existed in Scotland and Ireland with scarcely any repairs for more than a century, since before the time of Telford and Macadam. Concrete bridges and roadbeds built by the Romans nearly 2,000 years ago are still in use in spite of efforts to destroy them in military operations. The cost of this class of work is constantly decreasing through the cheapening and improving of cement, through the lessened expense of procuring stone and crushing it, and through growing experience in the use of cement. In Scotland it is common for farmers to contract for rubble concrete bridges, provide the stone, and hire masons to do the work. In this way the entire expenditure is kept in the locality, among the people who pay the taxes, and is therefore, in spite of a slightly greater cost, not unpopular. Up to forty foot spans, this construction is not difficult.

In the construction of a stone arch the first consideration is the foundation. The depth to which the excavation must be made will depend chiefly upon the span of the arch, and the nature of the natural soil on which it will rest. The chief object is that it shall be secure. If bed rock comes to the surface it may be safe to rest the base of the arch upon it without any further excavation. A firm hardpan may exist a short distance below the surface of the ground. But a quicksand, or other insecure footing, may necessitate the sinking of piles, or the placing of a wide, and perhaps deep, concrete base. But the foundation must be sufficient to provide that the washing of water cannot undermine it, that the lateral thrusts of the embankments cannot move it, nor that the weight of loads cannot cause it to sink. No more definite rule can safely be given than to make the most of local circumstances, with always a fair margin for safety.

Full-centre arches, that is, entire semicircles, are easily formed, possess great strength, and have little lateral thrust, but with wide spans, they necessarily rise to a correspondingly great height, and cannot always be employed. A segmental or flat arch will lessen the rise, but has a considerable lateral thrust which necessitates very strong abutments. A compound arch, made up of a number of different circles, when rightly proportioned, combines the advantages of the two, reducing the height, and at the same time having an excellent appearance. The

thickness of the arch and abutments depends upon a number of details, the chief of which are: the form and size of the arch, the quality of the material composing it, and the character of the workmanship. The haunches or shoulders should be built from the spring of the arch half way to the top.

With regard to the masonry, first-class hydraulic cement should be used. The arch stones should be full-bedded in cement, and each course afterwards thoroughly grouted. Each stone should be cleaned and dampened before being placed in the arch. Improperly dressed stones should be re-cut, as no hammering should be allowed after the stones are set. The ring-stones should be dressed into a wedge shape, so that they will radiate truly from the centre of the circle, and should be so dressed that the joints need not exceed three-eighths of an inch in width. The ring-stone should be of such thickness as to expose ten inches on the inside or face of the arch. The exterior of the arch should be flushed with a one inch coat of cement and the surface then smoothed off.

Arch-culverts and bridges of cement-concrete can be more cheaply constructed than can masonry arches, and if careful workmanship is employed, are quite as serviceable. They are formed by constructing a curbing and thoroughly ramming the concrete into it in successive layers. The manner of mixing the concrete depends upon the character of the cement used, some cements being slow setting, others quick setting; some will set in water, while others will not; some will allow a considerable portion of water to be used in forming the mortar, while other cements should be but slighly moistened.

One feature in connection with concrete culvert work is that, with the curbing and centres in place, an intelligent workman can, by following the instructions of the engineer, lay the concrete. Manufacturers complain that masons, in the great majority of cases, entirely disregard the instructions given them with respect to the mixing of cement, and follow their own medods of mixing common mortar; while a man totally unaccustomed to work of this description will obey instructions carefully and minutely. Concrete cannot be mixed and put in place like common mortar, and by overlooking this fact, much concrete work has failed and has brought the material into disrepute in some localities.

Bridge Abutments.

The most substantial substructures of bridges are of either stone or concrete. In their construction sufficient excavation must at first be made to properly contain the abutments, and this earth may be refilled again so as to form approaches to the bridge.

The excavation completed, when concrete is used in whole or in part, the portion thus constructed must be boxed and curbed in a substantial manner the exact size and shape required. After the concrete has set, this boxing is removed and earth filled in solidly around the face of the abutments. Hammer dressed stone should crown the concrete to form a bridge seat.

Concrete should be composed of first-class cement; a clean sharp silicious sand, entirely free from earthly particles and coarse enough to pass through a twenty mesh and be retained on a thirty mesh seive; clean screened gravel the largest not to be more than two and one-half inches in diameter; or in place of gravel, broken stone that will pass through a two inch ring. These materials should be mixed in the proportion of one of concrete, two of sand, and three of gravel or broken stone, with just sufficient water to form a plastic mass. The sand and cement should first be thoroughly mixed when dry, then water added to make a thick paste, and this thoroughly mixed again. This morter is then spread out and the stone or gravel added, when the whole is mixed together until every stone is thoroughly coated with mortar. When this is done the concrete may be put in place and should be spread out and pounded until the excessive moisture appears on the surface.

Masonry abutments should be of rock-faced ashlar, first-class in every respect. The projection of the rock face should not be more than three inches from the line of pitch. The stone used should be approved quarried stone laid on their natural beds, and all beds of stone dressed parallel and true, the bed to be always as large as the stones will admit. Vertical joints should be dressed not less than twelve inches in from the face, and as much more as the stone will admit, and particular care must be taken to have them well filled with mortar. Joints should in no cases exceed one-half of an inch in thickness. The courses ordinarily should not be less than eight inches in thickness. Each coarse should be dressed before laying, and not to be moved after being laid, or if moved, should be taken up cleaned and re-laid again in fresh mortar. The stones and work should be kept free from all dirt that will interfere with the adhesion of the mortar. Stones ought to be sprinkled with water before being placed in the work. Every stone must be laid with a full bed of mortar and beaten solid. Spaces in the vertical joints back from the face have to be built up, thoroughly grouted and each course finished off so as to be perfectly solid. Stretchers should be two and one-half feet in length, with a depth of one and one-half times their height.

Headers should be built in each course at least every four feet apart, and so arranged with the adjoining courses as to leave them equally distributed over the face of the structure. They should have a length in the face of the work of at least two feet and a depth of at least twice their length, unless the wall will not admit of this proportion, in which case, they will pass through from side to side of the wall. The backing or filling ought to be of good sized stones, and of such shape and so arranged that they will break joints and thoroughly bond the wall in all directions, and leave no space of more than six inches in diameter. All spaces must be filled in with small stones and spawls laid in mortar and thoroughly grouted.

The coping stones should be of the necessary sizes and shapes, well bedded and closely jointed. The upper surface should be bush hammered and the face

and corners brought to a true line. A tail wall, if built upon each abutment, may be of rubble stone work.

All mortar used in the masonry should be composed of clean, sharp sand, and an approved brand of cement. It should be of the best quality and freshly ground. The cement and sand for the mortar should be mixed in the proportion of three parts of sand by measure and one part of cement, the mortar to be made in a water-tight box or on a floor, and in no case on the ground. The ingredients should be mixed thoroughly in a dry state, and the proper amount of water added afterwards, and again thoroughly mixed. It must be used directly after mixing, or if not used within one hour after mixing should be discarded.

Design of Iron Bridges.

The design of iron or steel bridges commonly erected may be classified under: The plain beam or girder; the beam truss; the suspension truss; and the bowstring or arch truss. The first of these is well understood; the second comprises those trusses in which both bottom and top chords are essential; the third includes those in which the upper chord only is necessary; the fourth is not properly a truss, but an arch in which the horizontal tie takes the place of fixed abutments. The style chosen should be governed by circumstances and economy; but apart from this any design is good so long as it can be accurately analyzed as to the character and amount of strain in all its parts. On the other hand any design which cannot be so analyzed should not for a moment receive consideration.

The course pursued by some, indeed most municipalities, in erecting iron bridges is likely, however, to result disastrously, and throw iron and steel into disrepute. A council advertises for tenders. The companies responding supply their own plans and specifications. Thus far the procedure is entirely satisfactory. The difficulty arises when the councils accept the lowest tender without obtaining the advice of an experienced builder of iron bridges as to the plans and specifications submitted. Cases have occured in which a difference of five dollars has influenced a council to accept a tender for a bridge which manifestly, to a man of experience, was worth less than the other by several hundred dollars; and which was indeed unsafe, offering every likelihood of failure with attendant loss of life and great expense for reconstruction. It is difficult to understand the action of councillors, shrewd in other matters, in the construction of bridges and other public works proceeding with such apparent disregard for the true interests of those whom they represent. A small sum in securing reliable advice is as much a matter of economy in public as in private affairs.

Painting Iron Bridges.

The prevention of rust is a matter of first importance in the care of iron and steel bridge work. The first principle in so doing is the exclusion of air and moisture. Galvanizing and painting are the two most commonly adopted mean

for accomplishing this end. If the coating could in all cases be made continuous the result would be reached, but it is impossible to prevent slight breaks no larger than pin points perhaps, but which admit air and moisture. With these as a point of commencement, corrosion goes on beneath the coating, and is all the more dangerous because concealed. The durability of painted iron work depends largely upon the surface of the metal being properly cleaned and prepared to receive the paint or zinc coating. An ideal paint should have a toughness that does not depend upon a perishable ingredient; its elasticity should not be diminished by cold; it should not soften, but rather hardened by heat; and it should contain nothing which would act as a carrier of oxygen to the metal. Most engineers have a pet compound, that recommended by the chief engineer of the Bay of Quinte Railway being composed of one pound of lamp black, eight pounds of red lead, one gallon of raw linseed oil, the color being a rich chocolate brown.

Painting Wooden Bridges.

The painting of timber in bridges is a matter of some importance. The effect of paint on wet timber is to retain moisture and cause the so called "dry rot." If the timber is dry and well seasoned, the better practice is to apply a coating of paint at once. It is, however, a mistake to paint unseasoned timber in a bridge until it has stood a year; and the work should be done at the end of the summer when the wood is thoroughly dry.

Because of the tendency of paint to retain moisture, there has been some dispute as to the advisability of painting very large timbers in a bridge, the tendency of the paint being to increase the "dry rot," Nevertheless, the timber reaches a certain stage, after sufficient seasoning, when to exclude the atmosphere by painting tends to its preservation.

It is not considered good practice, however, in wooden bridge construction, to use any timber more than six inches in thickness. Where greater strength is required, in caps, beams, cords, braces, etc., a sufficient number of pieces of this or less thickness should be built together by keys, packing pieces and bolts, thus allowing a free circulation of air. Over members thus composed should be placed a covering of galvanized iron, extending a half or three quarters of an inch down on the timber, and secured by galvanized tacks, preventing the rain from entering the spaces or resting in or around the packed points.

The bridge thus built should be given one thorough coat of paint the summer following its construction, and a second one should be applied the third year. The ends of all timbers, all seats, joints and bearings should be well coated with white lead at the time of construction.

Economy of Iron Bridges.

The economy of iron and steel bridges for replacing wooden structures is a matter in which definite statistics are not available. The steel superstructure should last half a century, while the masonry piers and abutments, with first class

material and workmanship, and careful attention to repairs should be good for at least twice that period. The life of a wooden bridge may be placed at fifteen years; and during that period expensive repairs will be required. If the cost of the iron and masonry bridge is twice that of the wooden structure there is still a wide margin for profit. The price of concrete, masonry and steel is constantly decreasing; that of timber is becoming greater, while the quality available is degenerating; and it is not difficult to fortell that, in future, culverts and bridges will necessarily be built of permanent and durable materials.

THE INFLUENCE OF PAVEMENTS ON PUBLIC HEALTH.*

In presenting to this association a paper on the sanitary aspect of pavements I have been actuated by a desire to obtain information rather than to impart it. Ontario has so recently developed from a wilderness to the home of civilization and culture; our villages have grown so quickly into towns, our towns into cities, and the advance of the various sciences has been so rapid, that our people scarcely realize the changed circumstances and the need of carefully directing their energies in meeting the demands of the times. In my visits to different parts of the Province I am constantly met with evidences of the good wrought by this association. I find that in very small villages even, inefficient drainage, cesspools, piggeries, slaughter houses, and impure water supplies are not now tolerated as they were once, and that this is due to the work of your association. It is with considerable hope, therefore, that I have undertaken to briefly lay before you the subject of pavements and public health, confident that you will lend your assistance in adding to our knowledge of this as of other matters pertaining to perfect sanitation; and where reform is needed your aid will be afforded.

There is no one paving material which possesses every quality desired in a pavement to meet all conditions and uses. The ideal pavement remains to be discovered; but the features which should belong to such an ideal pavement are so numerous and of such varying character as to render the search apparently a hopeless one. The ideal pavement: 1, should be cheap, and economical of maintenance; 2, should be durable; 3, should suit all classes of traffic; 4, should offer little resistance to traction; 5, should give a good foothold to horses; 6, should be adapted to all grades; 7, should have a good appearance; 8, should not be muddy or pervious to water; 9, should be sanitary, that is, non-absorbent, not subject to decay, easily cleaned, not dusty, not noisy.

It is apparent then that, notwithstanding the importance of the sanitary aspect of a pavement, there are other features which must be considered. The primary intention of a pavement is to accommodate travel, and to provide one which will do this satisfactorily, which will be durable, cheap, of good appearance, healthful, and possess in the highest degree the other qualities enumerated,

*A paper read before the Association of Medical Health Officers of Ontario.

in view of the location, nature and extent of traffic, is the problem which presents itself to the paving engineer. Just as no absolutely perfect paving for every time and place has been discovered, it is doubtful if any paving material now used should be utterly condemned, Each has its place in which, until the ideal, universal pavement is found it will be more satisfactory than any other which could be used under that particular set of circumstances of soil, climate, traffic, etc. The purpose of this paper, however, is to treat of the healthfulness of paving in general, of the sanitary aspect of commonly used paving materials, that is, asphalt, stone blocks, vitrified brick, cedar block, and broken stone, (macadam) with respect to absorption, decay, ease of cleaning, dustiness and noise.

Of all these, cedar block has received the greatest censure on the score of unhealthfulness. The late Dr. O. W. Wright, Health Officer of Detroit, is quoted as saying: "On sanitary grounds I must earnestly protest against the use of wooden block pavements. Such blocks, laid endwise, not only absorb water which dissolves out the albuminoid matter that acts as a putrefactive leaven, but also absorbs an infusion of horse manure and a great quantity of horse urine dropped on the street. The lower end of the blocks, resting on boards, clay or sand, soon becomes covered with a fungoid growth thoroughly saturated with albuminous extract and the excreta of animals in a liquid putrescible form. These wooden pavements undergo a decomposition in the warm season, and add to the unwholesomeness of the city. The street in fact, might as well be covered a foot deep with rotting barnyard manure so far as unwholesomeness is concerned. Moreover, the interstices between the blocks and the perforations of decay allow the foul liquids of the surface to flow through, supersaturating the earth beneath and constantly adding to the putrefying mass." Cedar block has been condemned in similar terms by many others. On the other hand, Col. Heywood, Engineer of the City of London, England, has said: "It has been said that wood pavements at all times smell offensively and may be unhealthful; but although some city streets have been paved with wood for thirty years, no complaints that I am aware of have been made to the commission on this head, and the inhabitants at all times have not only expressed great anxiety lest the wood should be replaced by other materials, but have subscribed towards the cost of its renewals. . . . I have at times noticed offensive emanations from it near cab-stands, but am unable to find further evidence of its unhealthfulness. These remarks must be held to apply only to public streets open to the sun and air, and traffic; in confined places and under some conditions, wood might be objectionable. I have seen it decaying in confined places without traffic."

The one statement by the Medical Health Officer of Detroit refers directly to the cedar block pavement as we understand it in this country. The other opinion, that of Col. Heywood of London, is expressed as regarding the wooden pavements as laid in European countries. Between these two pavements there is a vast difference. Under European practice, many of the pavements are of the

Karri and Jarrah woods of Australia, which are thoroughly saturated with resins, are very hard, and are not subject to decay. They are sawn into brick-like blocks and laid on concrete. Where soft woods are used, they are also cut into regular oblong blocks and laid on concrete, but are saturated with creosote or treated with some other preservative process.

Wooden pavements of America, however, represented by cedar blocks, are of a very different order. The round blocks of irregular diameter, are merely the untreated wood, still carrying the bark. These, placed on a bed of sand, are under the most favorable conditions possible for decay, being constantly exposed to moisture, air and warmth. With no preservative treatment they are enabled to absorb to the fullest extent all forms of liquid street-filth, which in the process of putrefaction, feeds on the organic matter of the wood. The surface, which quickly becomes uneven, retains a large quantity of loose matter subject to decay, the whole giving rise at times to noxious odors. The effect, were sufficient of such paving used, would subject us to the conditions favorable to marsh fever. From a sanitary standpoint, the cedar block pavement of this country would indicate a serious menace to health. At the same time, while we are justified as a matter of theory in arriving at this result, there do not appear to be any statistics to prove the conclusion to be a correct one. The death rate of cities most largely paved with cedar blocks does not bear any ratio to the extent of such pavement; nor does a change from cedar block to another less absorbent pavement produce a noticeable effect on the death rate.

In European practice, wood, more suited to a business street than macadam affording a better foot-hold for horses than asphalt, less noisy than granite setts, is exceeding popular in spite of its less sanitary character. In this country, however, there is an unwillingness to renew the wooden pavement when decay has rendered it unfit for further use, and this, coupled with the less careful method of laying, is the cause of the complete disrepute into which it has fallen.

Experiments have been made recently by a Polish scientist with regard to cedar blocks. The bacteriological examinations showed that, in specimens taken from blocks which had been in use for four years, and from a depth of one centimetre and two centimeters below the surface, there were at the end of five days 650,000, 220,000 and 12,100 bacteria per gramme of wood. A later examination showed 1,200,000 colonies per gramme in the surface of the wood, and 8,600 colonies at two centimes below the surface. An estimate, in terms of its nitrogen, was made of the organic matter absorbed by the wood, and indicated that the surface layer of wood contains more nitrogen than the most polluted soil. A comparative estimate of the pollution of the atmosphere was made by placing a definite quantity of sulphuric acid under a glass bell, on the surface of wooden and ashpalt pavements, the result, as indicated by the quantity of ammonia absorbed by the acid, being much in favor of asphalt.

The observations show that while a wooden pavement gives absolute protection to the soil and subsoil water, there was a considerable atmospheric contamination. The experiments were made on blocks of pine, preserved by impregnation with copper sulphate. Such being the case, with a wooden pavement laid under European practice, there can be little doubt of the unwholesome effect of cedar block upon the atmosphere. Further experiments of this description, conducted by members of your association, would doubtless prove instructive and profitable.

Broken stone or macadam would next arouse suspicion with regard to its absorptive qualities. There is this great difference between the two, however, that whereas a wooden pavement itself decays, and affords food for the decay of other organic matter falling on it, the macadam does not in itself decay. With underdrainage, such as a well-built macadam road, possesses it should be little more than a good sewage disposal bed for the comparatively small amount of sewage which falls upon it. A macadam pavement can be scraped, and swept, it is not too noisy, dust can be subdued by sprinkling, and on sanitary grounds appears to be an excellent pavement for residential streets where traffic is not excessive. For business streets, or for heavily travelled thoroughfares of cities, a harder surface is advisable. With regard to absorption, there can be no objection to asphalt, vitrified bricks, nor stone blocks. Asphalt is impervious to water; while the joints of brick or stone pavements are practically perfect so far as absorption is concerned.

A pavement, to be sanitary, should not be dusty. The dust of a pavement is not only an irritant, but carries with it the bacteria of disease, which from various sources are a part of street filth. To prevent dust, the pavement must be so perfectly cleaned that a practically harmless amount is taken up by the wind; or if perfect cleanliness is not possible, dust must be subdued by sprinkling. Unless perfectly cleaned. much better cleaned than is usually the case in this country, an asphalt pavement is apt to be a disagreeably dusty pavement on a windy day in summer.

This, indeed, is one of the greatest faults from a sanitary standpoint. Toronto has the reputation of being a clean city, with a well-organized street department; yet under these favorable conditions, a walk or drive down Yonge St. on a warm, windy day is a very trying experience. The smooth, hot surface quickly dries any matter falling upon it, a wheel passing over this dry substance grinds it to powder, and the result is that clouds of dust find their way into the eyes, nose, mouth, throat and lungs of pedestrians. Business men in their offices are not safe from attack, as it drifts in through the open windows. The dust imbeds itself in clothing, fastens itself on articles of food exposed in the shops, to be eaten finally by the purchaser. One case came to my notice in which a consumptive patient was ordered by his physician to leave Jarvis Street, one of the best resi-

dence streets of Toronto, because of the dust which came from the asphalted roadway. These streets are swept by machines, and are handswept by a corps of city employees, but are not, to my knowledge, flushed as are similar pavements in London and Paris. Flushing is the only method whereby asphalt can be freed from this unsanitary dustiness, but in addition to being expensive and hurtful to the asphalt, such a proposal will meet with the disapprobation of the engineer in charge of sewers. The dust, however, is not a defect of the pavement so much as it is a fault in the method of cleaning.

Asphalt has, nevertheless, the disadvantage of being a very hot pavement. Its smooth surface, reflecting back the heat and light, is productive at times of sun-stroke, and the glare is frequently painful to the eyes. This is most noticeable in closely built business sections where there is least circulation of air, where the sun beats down between high brick walls; and is not so objectionable on a shady residential street with houses well apart. Vitrified brick and stone block pavements are neither so dusty nor so hot as asphalt, since the surfaces are less smooth and assist in retaining in the joints the finer particles of dust. Sprinkling too, is in a greater measure effective in subduing dust on brick or stone block than on asphalt, from the hot, smooth surface of which moisture evaporates rapidly. A macadam pavement is dusty if not properly treated, but if scraped and swept as are other pavements, the dust can be largely subdued by sprinkling.

Noisiness, if excessive, is another unsanitary feature. A noisy pavement is jarring to the nerves, grating upon the sensibilities, and for either a heavily travelled business street, or a residential quarter, a quiet pavement is much to be desired. Noise itself is not always unhealthful. It is doubtful if the workman in a boiler factory, or a railroad engineer, or other employee, is much influenced by the noise incidential to his occupation. Both are muscular of body, constantly taking vigorous exercise. But to the more sedentary man of business, whether at high nervous tension in his office, or resting in the quiet of his home, a din, constant or intermittent, is a source of annoyance, and as such is wearing to the nervous system. The most objectionable in this regard is granite or other stone block pavement. Vitrified brick is apt, unless great precautions are taken, to create a disagreeable rumbling. Asphalt, wood and macadam are the least objectionable with respect to noise.

While we have this to say of the comparative healthfulness of different varieties of pavements, there is another condition of matters common to too many towns and cities, in which the streets, in fall and spring, form a wilderness of mud and stagnant pools, and in the summer are shapeless beds of dust. Many of them are made receptacles for the refuse from private property, which is left to disfigure the street, forming rivers of filth and cesspools of disease. Such streets have been regarded as a zero quantity, doing no particular harm doing no particular good. Streets, however, which do no good, should do good, and therein

lies the harm. A good street is a well drained street, a well cleaned street, and is a source of healthfulness to the members of the community. Streets should be the public parks, pleasing to the cultivated taste, adding to the culture and refinement of the people, and enticing them to breathe health and vigor, whether walking, bicycling, riding or driving. Passing along the city street we reach the country highway, which as a means of permitting the people of the city to leave the congested portions and to reside in the less thickly populated suburbs, forms an important factor in securing public health

TOWN STREETS.

General descriptions of plans for street improvement have been issued in previous publications. Every town and city, however, possesses local circumstances peculiar to itself, requiring special consideration and adoption. The following report to the City Council of Windsor, Ontario, while containing, briefly, an outline of the means to be employed, and capable of universal application, contains references of a local nature, having much, nevertheless, of useful suggestion to other Councils:

To His Worship the Mayor and Members of the Council of the City of Windsor, Ontario.

GENTLEMEN.—In accordance with the request of your Council forwarded me by your city Clerk, I visited Windsor on the 2nd inst., examined the streets, and conferred with the Mayor, your Board of Works, Street Superintendent and City Clerk; and herewith submit the following report as to the present condition of the streets, the system of control, and the methods which should be adopted for their improvement:

Present Condition of Streets.

A number of streets, Sandwich, Pitt, Ouellette, Glengarry, Windsor, Church, London, Chatham, Dougall and others have been paved with cedar block. The majority of these pavements have survived their usefulness, and are now exceedingly rough from decay and wear. A few sections, such as Sandwich Street, from the G.T.R. bridge to Church Street, have been recently laid, and are still in serviceable condition.

The streets not paved with cedar block are dirt roadways which, during the summer, are kept nicely crowned, and the gutters well shaped and cleaned by the persistent and skillful use of a grading machine.

Broken stone has, in a few instances, been placed on top of these dirt roadways, but broken stone used in this way is of but little service in improving town streets; these are, by the general public, understood as "macadam" roads, but are totally devoid of the principles advocated by McAdam.

Expenditure.

The construction of cedar block pavement has cost $172,331, during the past twelve years. On the repair of streets about $10,000 is spent annually, which represents for the past twelve years, $120,000.

The total amount then, spent by Windsor in the past twelve years, on pavements and sidewalks represents nearly $300,000—over a quarter of a million dollars. This is a very large expenditure, one which, without better returns, no city of the size of Windsor can afford. The expenditure indicates on the part of the citizens, a most praiseworthy desire to advance the true interests of the city. It indicates that the importance of well paved streets has been fully appreciated by the taxpayer; it indicates a willingness to pay for well-paved streets. It is in fairness to be pointed out that a considerable proportion of this has been spent on work from which permanent results could not be expected. There were annual repairs, street cleaning, removal of snow and similar details, from which only temporary benefit could be had. At the same time, it must be apparent to your council that permanent improvements are very few in comparison with the large expenditure. And notwithstanding its apparent simplicity, it is evident that the paving problem has not been solved in Windsor. Good streets cost a large amount of money, but bad streets cost vastly more.

Temporary Work.

While cedar block may at one time have been, in the opinion of some, a serviceable and economical pavement for business streets in the immediate business section, it was not an economical pavement on residential streets subjected to but little traffic, where failure must result from decay rather than from wear. For the residential streets of Windsor, much has been lost by overlooking the claims of broken stone roadways in place of cedar block. The mistakes which have arisen, and which by no means have been confined to Windsor alone, are the result of insufficient acquaintance with paving methods and materials, and a consequent misuse of them.

The dirt roadways which constantly require to be re-graded, which are good in the summer season only, and which in spring and fall become shapeless, muddy and of little use for travel, are a constant source of expense for repairs. In this case the error, in a sense, is the reverse of that arising from the use of cedar blocks on residential streets, the roadway being too weak to support the traffic, and the consequent outlay for repairs very great. Here again the use of macadam has been neglected. The expense of grading these streets year after year is very great. To obtain good results from the least expenditure, a larger amount should be spent in the first construction of permanent broken stone pavements, and a very much less amount in the repair of temporary dirt roads.

In sidewalks, no use has been made as yet of cement-concrete in place of plank, and the consequence is a large outlay for repairs.

Throughout the whole, there is an evidence of temporary construction which, cheapest in first cost, after a term of years when the cost of repairs is included, is the dearest. The waterworks system has been constructed at a cost of $304,000. Since 1884 the sum of $302,000 has been spent on sewers in addition to a considerable expenditure previous to that time for main sewers, the exact amount being difficult to ascertain, as it was raised in connection with funds for school purposes.

On the sewerage system, waterworks, public buildings, churches, places of business, and private residences, permanency has been sought. But in street work, sidewalks and pavements, it is apparent that a different policy has been pursued. Everything connected with streets has been built in the most temporary manner, little remaining to represent the expenditure but rotting blocks which will soon have to be removed; clay streets which dissolve after a shower; decaying sidewalks which are constantly being renewed.

Frontage Tax.

The Frontage Tax system has its advantages and, where the by-law has been carefully prepared, should give satisfaction. But very great care should be taken in framing the by-law so as to adjust it to local circumstances as far as possible. It is a simple means of raising the money, and of levying the tax, and when an equitable mode of assessment is provided, regulating corner, triangular, or irregularly-shaped lots, side-hill and similiar property, as well as street intersections, levying a just proportion against the general funds, it invariably stimulates street improvement.

Unfortunately for Windsor, the system has not operated equitably in all cases. The residents of certain streets, with commendable loyalty to the best interests of the city have petitioned and paid for expensive pavements, in the expectation that other streets, equally able to bear the tax, would follow in due time. The result, however, has been that a number of important streets are still unpaved, and an undue amount of travel has been thrown on the improved streets; while the unimproved streets, by the use of the grader, and because of the little travel which they receive, are in as good condition.

The injustice does not appear to lie in the fact that streets other than those improved did not follow with improvements but that, unfortunately, the wrong materials were used, and the property-owners who made the improvement, are now called upon to repeat the expenditure. The fault does not lie in the frontage system but in the character of the work performed under it. Viewing it in this light, it may have been well for you citizens that no more work was undertaken with this class of material. Because in nearly every instance where cedar block was laid on residence streets, first-class macadam should have been used. Had this been done, with due attention and repair those streets would be in as good condition to-day as when first constructed.

Now that the subject is better understood, and councils and citizens are taking so much interest in the question, certain amendments to the Act would render the frontage system more just and workable, and these, no doubt, could be secured if proper representation were made. It would, for example, be better, in cases where the council considers it necessary to take the initiative, to require an adverse petition of two-thirds of the property owners; after which if the council still considers the work necessary they may proceed on a two-thirds vote of their own number.

Where the improvement of leading entrances to the city is undertaken and the property on either side of the street in the outlying sections is not built up or improved, or for any reason is unfit for building purposes, and the Council does not deem it equitable to assess such property in the same proportion as other property, then the Council should have the power, in all such cases, to determine the proportion.

And further, it would be well to provide by by-law for the payment of say one-third of the cost of all street improvements out of the general funds. When the Act was framed little interest was taken in the question of street improvement, and the intention undoubtedly was to permit the residents on certain streets, desiring their improvement, to have it made and the payments extended over a term of years; the principle being to allow them to get what they wanted and pay for it. This was taken advantage of by the more progressive citizens, but very seldom in a general way. With the changes of time and conditions, the demand to-day for improved streets is general, and no system should be adopted which will not to a reasonable extent provide for this.

An injustice to the outlying sections, less inclined to realize the advantages of improved streets, would be apparent at the first sight of this proposition, but

upon examination it will be seen that it would be found just and equitable. The opinion of the property holders in such sections generally is that streets demanding any improvement beyond the safe condition of the roadway, should pay for such improvement, believing that the benefits are purely local.

This, however, is erroneous, as no improvement can be made upon the streets of a city without benefitting the whole place. The nature, and consequently the cost of these improvements should be proportionate to the service which they render, and should not be wholly regulated according to the desire of the owners. Before any work is undertaken a comprehensive plan of the city outlining the character of the improvements proposed for the different streets, width of roadway, location of sidewalks, estimated cost, should be prepared, and followed as nearly as possible. The highest assessed property, where the most expensive pavement is required, pays a proportionately great share of the cost of that pavement as well as of the least expensive pavement.

Street intersections should be charged to the general funds, otherwise a street first undertaking improvement would be charged with all intersections, and other streets crossing this and subsequently undertaking improvements would be relieved from the cost of these street intersections.

In assessing the cost, the engineer should make an allowance on corner, triangular, or other irregularly shaped pieces of land situated at the intersection of streets. It is difficult to specify what this allowance should be, as regard must be taken to situation, superficial area, etc. A plan much favored is to charge two-thirds of the frontage on the side of the lot to be assessed.

The frontage tax system is a simple means of raising the money. No matter how small the work, the money can be easily provided. It is a check on careless management, because contracts must be separate, are not large, are understood by each property owner who feels directly interested, and studies the contract, watching closely its execution.

Whereas, under a plan of general assessment, money must be raised by by-law voted by the freeholders generally: consequently in large sums which would not likely be expended as judiciously or the work performed as economically. Where an effort is made to raise as large a sum of money as would be required to perform even the most important work, considerable opposition would be offered by sections not directly benefitted, and subsequent by-laws would meet much opposition from those previously served. The frequent submission of by-laws for any purpose is found objectionable.

Some expression was given to the wisdom of returning to a system of general taxation for street improvements. Under this system the main streets and entrances to the city might be more quickly paved: nevertheless it would form a total denial of the principle embodied in the frontage tax system, that the property directly benefitted should bear the greater proportion of the cost; and at the same time, as pointed out, there are difficulties to be encountered in passing the necessary by-laws raising large amounts of money, created by sectional jealousies and other causes which cannot definitely be foreseen.

The Ward System.

Good streets and the ward system are incompatible. Under any circumstances, the ward system of representation is not favorable to the best city government, and with a system of general taxation for street improvement, its abolition (for which recent legislation provides) becomes imperative. Every year, in

the larger municipalities, several thousands of dollars are divided among the wards; and this again is subdivided by the representative, or under his influence, and is scattered over the street area. Frequently work is attempted which is never completed, and not infrequently, work is done which would be better undone. It is in direct violation of the more economic management of streets whereby the expenditure would be concentrated in work of a substantial and finished character, and afterwards systematically maintained. Instead of this, under the ward system the effort is to build streets by an extensive series of disconnected patches, and to repair streets which were never constructed.

A Standard Pavement.

A standard pavement in Windsor for streets other than those in the immediate business section should be macadam. A well-kept macadam driveway is in keeping with well-kept boulevards, lawns and shade trees, the characteristics of a residential street; it has a cool appearance, the dust can readily be kept down by sprinkling, and for light driving is the favorite among horsemen. Bicyclists, now an important section of the community, usually favor macadam, in preference to the more costly classes of pavement. A comparison of macadam with asphalt or vitrified brick, in point of utility and beauty, will not result unfavorably to the former, for use on residential streets. It is not to be inferred, however, that broken stone roadways are recommended for streets in the immediate business section, where a harder and, in a sense, a cleaner surface is desirable.

By proper attention to repairs, the life of this class of pavement can be made continuous. The surface can be frequently rolled, improving it greatly. It can be scraped and swept as are other pavements. When it begins to lose shape the surface can be loosened up by means of teeth attached to the roller, a light coating of new metal applied, and then rolled down as well as when new. It is by such means as these that broken stone roadways can be made much more economical and satisfactory than any other for streets generally. This ease of renewal, and repair is a property peculiar to macadam, which renders it most satisfactory for general purposes. While the cost in the first instance may nearly equal that of cedar block, yet at the termination of the period when cedar block is decayed and has to be torn up or renewed, the macadam, if properly treated, is still in a good condition. It forms a permanent basis, and its perpetuation is merely a matter of repair to be met by the general funds.

Except under excessive wear, or where in business sections a high-grade pavement is necessary, broken stone pavements, by the aid of a steam road roller, are beyond doubt the most serviceable and economical, and give greatest satisfaction to the taxpayer.

Cedar Block.

The real life of cedar block paving will average only about seven years. Up to that time the surface is moderately smooth. Many of these pavements are allowed to stand, however, for ten or twelve years, at the end of which time they have become almost impassable, for the last half of their existence having received constant repairs, the cost of which is very great, a fact which your council must be experiencing in the effort to keep your cedar pavement in repair. Except for a few years after construction, cedar block makes a very rough road surface, is temporary, dirty, unsanitary, and the appearance is unsatisfactory. This is the result of Canadian experience with cedar block, except under favorable conditions which do not exist in Windsor.

Asphalt and Brick.

For a pavement such as is required in the business sections of your city, the essential qualities are:

(1) A secure and pleasant footing for horses.

(2) Smooth, so as to render travelling and traction agreeable, easy and noiseless.

(3) It should be sanitary; the form and material such that it will be impervious, liquids will not have permanent lodgement, and dust will not be easily produced.

(4) The durability and service rendered will be commensurate with the cost of construction and maintenance; that is, it must be economical.

(5) It must be easy of removal, replacement and repair at reasonable cost and with the appliances and materials within the control of the corporation.

In view of the above it will be apparent, I believe, that brick and asphalt are the two competing materials. With regard to the first quality, the foothold afforded to horses, brick must have the preference. It is one of the objectionable features of asphalt that it is exceedingly slippery when wet, and even when dry it is not always safe.

As to the second quality, asphalt must take first place since it is in a slight degree smoother and less noisy than brick. It is doubtful, however, if traction is any easier, owing to the insecure footing afforded to horses.

There is little if any difference between the sanitary status of the two pavements. Both are, of course, impermeable and offer little resistence to the flow of liquids; the joints of the brick are just sufficient to retain moisture and subdue dust. With the smooth asphalt surface no amount of sprinkling will keep the surface moist in hot weather.

As to cost, asphalt is from one-half to one-third more than brick, and experience has not proven its life to be any greater. As to durability, there must always be the proviso that good material and proper plans and methods of construction are used in any case.

The laying or repairing of brick does not require skilled labor as does asphalt, and this difficulty in connection with the latter is felt more particularly in places where only a short section of asphalt is used. In large cities the inconvenience is not so great.

While asphalt is extensively used in the United States and Canada, and is unquestionably a good paving material for certain streets of large cities, I believe brick to be more suited to the requirements of your City.

The quality of a brick pavement is not to be gauged by the best brick used in its construction, but by the poorest. For this reason it is necessary, in deciding on the kind to use, to see that it comes up to the standard of scientific tests. More than this, while the building of the pavement is in progress there should be careful inspection to see that no brick of an inferior quality is used.

There is a tendency also, to reduce the cost of a pavement by having a cheap foundation. Foundations of gravel, sand and macadam have proven successful in a number of cases, but only were the natural sub-soil is of a loose and porous nature. In this climate where we are subjected to alternatives of frost and slush, the experiment is a dangerous one. A foundation of six inches of concrete should be used. On this, place a one-inch cushion of sand, and fill the joints of the brick with a cement of tar and sand. The earth sub soil should, of course, have been previously graded and thoroughly consolidated with a heavy roller.

Cost of Pavements.

A suitable asphalt pavement on a six inch concrete foundation, with a five year guarantee, in Windsor would cost $2.50 per square yard; with maintenance guarantee for fifteen years, the cost would be about $3.00 per square yard. A vitrified brick pavement laid on a similar foundation would cost approximately, $1.75 per square yard and should last for fifteen years. A first-class macadam pavement would cost about 75 cents per square yard, the life of which would be continuous by means of proper repair. On a 24-foot roadway where the curbing is now set, the cost to an average lot having fifty feet of frontage, for such a macadam road would be $4.21 per annum for ten years, providing that street intersections and one-third of the cost were charged to the general funds.

Classification of Streets.

To place any system on a satisfactory and equitable basis, the improvements must be made in a business-like manner according to a carefully prepared plan which will adjust the right class of pavement to each of the streets, according to traffic and requirements.

In preparing such a plan the streets must be classified. It may emphasize the effect of classification by pointing out that a light macadam roadway costing 25 cents per square yard for a little travelled street, and an asphalt pavement, costing $2.50 per square yard for a business block, would each be economical and satisfactory, yet they could not be interchanged except at a loss. A light macadam on a business street is quite as unwise an investment as asphalt would be on one of the least important streets. The main streets in the business sections, naturally fall into a class by themselves, requiring the most expensive form of pavement. These in Windsor, are Sandwich Street from the C.P.R. Bridge to Church Street; Ouellette Street from Sandwich Street to London Street; Pitt Street from Windsor Avenue to Ferry Street; and Goyeau Street, from Pitt to Sandwich Street. On these sections, as has been pointed out, vitrified brick is the most suitable pavement (except, for the present, that portion of Sandwich Street from the C.P.R. bridge to Church Street, which has recently been paved with cedar block).

There are other streets heavily travelled, but which do not require so expensive a form of pavement as those just enumerated, and for which a strong macadam is most suitable. Such streets are: Sandwich Street from the C.P.R. bridge westerly; Sandwich Street from Glengarry Avenue to Walkerville; Wyandatte Street; Howard Avenue the main entrance to the City from the south; Glengarry Avenue, Aylmer, and London Streets the main entrance to the City from the west.

A lighter form of macadam may be used on a third class, comprising such residential streets as Goyeau Street, Ouellette Avenue, Dougall Avenue, Chatham, Church and Pellissier Streets (the last mentioned newly block-paved)

On streets of less importance a still lighter macadam may be used; constructed however, in all respects according to the best principles of road-making.

In laying down a system of waterworks, the first step to be taken is to prepare a plan of the whole municipality and determine the size of the pipes to be laid on each street to meet the requirements. The sizes of pipes are classified, main, circuit and lateral, and range possibly in size from a 24-inch main to a 4-inch lateral. The 4-inch pipe is as efficient as the 24-inch, considering the service it has to perform. Interchanged they would be useless. Much economy is practised in the careful designing of such a plant. So also should it be with

sewers, and before any work is undertaken, a plan should be prepared, not only providing for present, but as far as may be, for future requirements in capacity and disposal. As with waterworks and sewers so it is with streets. Before anything is done a similar plan should be prepared which will adjust the right class of pavement to each street according to requirements.

Construction of Broken Stone Roadways.

Macadam or broken stone roadways have not yet been understood in your city. The practice has been to pile broken stone in the centre of the roadway on top of the natural soil, or to bring the earth from the gutters to the centre of the roadway, placing the stone on top of this. This is the plan usually followed in grading township roads, but is unsuited to city street construction.

The roadbed should be excavated to the required width to receive the broken stone, and the excavated earth may be used in making boulevards or filling in the low lots to bring them to the grade of the street. The side of the street should be levelled to conform to the surface of the roadway. The general plan is much the same as for cedar blocks, except that a broken stone roadbed is used instead of cedar blocks. From 24 to 26 feet between curbs is a sufficient width of pavement, except where the street railway is laid, when extra provision should be made, for a single or double track, as the case may be.

The stone should be broken by means of a rock crushing machine which should be owned and operated by the city. In order to lessen the initial cost, small crushers are often purchased with the intention of operating them to their full capacity. Owing to the great variation in material, and the severe trials to which these machines are subjected, it is advisable to provide a machine which will not have to be operated to its full capacity. One of about two cords per hour of which only two-thirds the capacity should be used, would be suitable. The extra cost would prove a profitable investment.

By having a rotary screen attached to the crusher, the stone as it passes through is graded according to size. The grading of the metal is the most important part of the work which the crusher has to perform. When stone is placed on a road without being graded, large stones surrounded by smaller, the latter wear more quickly, and the surface becomes uneven. The large stones also, do not rest firmly on the surface, but are more easily disturbed and are apt to roll loosely under the wheels of vehicles and the feet of horses. Material of uniform size, placed in regular layers of coarseness, properly consolidated, will form a smooth surface, distributing traffic and wear uniformly. The grades of stone frequently are:

1st. Such as will pass through a 2½ inch ring.

2nd. Such as will pass through a 1½ inch ring.

3rd. Such as will pass through a 1 inch ring.

4th. Chips and dust screenings.

The stone should be placed on the roadbed in layers of not more than four inches in thickness, the total thickness of the covering to range from eight to twelve inches according to the strength of road required to support the travel. With each layer should be mixed a quantity of the chips and stone dust to assist in consolidation: and the surface should be finished off with a thin coating of screenings.

More stone should be placed at the centre, than at the sides. Where the thickness in the center is twelve inches, that at the curb should be about eight

inches. The thickness of the different courses from the bottom upwards, would be eight inches of two and one-half inch stone; three inches of one and one-half inch stone: and one inch of inch stone. At the curb, the thickness of each layer will be proportionately less.

In the process of laying, the material should be thoroughly rolled, and consolidation assisted by a liberal application of water. Excellent samples of this class of road may be conveniently seen by your Council in London, St. Thomas, Ingersoll, Stratford, Galt and numerous other points.

After the excavation and boulevarding has been completed, the curbing set, the foundation underdrained and sub-grade thoroughly rolled, an excellent plan, where the material can be procured, is to place a layer of quarry flake stone, from two to four inches in thickness, in the bottom of the roadway, and then to place on top of this about nine inches of hard, crushed stone coursed and in layers as previously specified. Quarry stone for the foundation, or for the first layers of the roadway, could be obtained from Amherstburg at a cost of $3.00 per cord f. o. b. Amherstburg. The material can also be obtained in large quantities at Pelee Island. Field stone for finishing the road can be obtained in the vicinity of Kingsville, Harrow and Ruthven, and costs f. o. b. at those places about $2.75 per cord—to which must be added the cost of freight and crushing. In all this would amount to about $6.50 per cord crushed at Windsor.

Of course the harder and tougher the stone used for surfacing the street, the more durable will be the roadway. Trap rock is undoubtedly the best material. Its scarcity, however, limits its use. It can be had in large quantities from the north shore of Lake Superior, the city of Cleveland importing largely from that district by boat. Being located on the route, you should be in a position to obtain this material at reasonable cost.

Rolling.

For economical, durable and serviceable roadmaking, a heavy roller is indispensable. A road should be sufficiently smooth and compact to shed the water readily to the side gutters. If the gravel or other metal is dropped from the wagon loosely on a soft earth foundation, as is your practice, water passes into the sub-soil as into a sieve. Wheels passing over the road when in such a condition at once sink into and rut not only the gravel, but the earth beneath. Water is held in the ruts and each succeeding vehicle renders their condition worse. The road is less durable since, the gravel being mixed with the dirt beneath, it obtains, when fully consolidated, a dusty, easily-worn surface.

The weight of roller must depend upon various circumstances—the amount of work it will be required to do, the quantity of road metal used, the strength of the bridges and culverts over which it must pass. A steam roller costs more than a horse roller, but does so much better and faster work that it is more economical. A nominal 12½ ton steam roller is commonly used, and would be most suitable for your city.

Curbing.

The streets which are block paved have been provided with stone curbing which is a very important detail of a well-designed street. It is the one part of the work in Windsor which, in first construction, was made of durable material and does not need to be renewed. This curbing defines the roadway, protects the boulevards and gutters and keeps the paving material in place: and on all other streets the same plan should be continued.

Drainage.

From the lay of the land, the quality of the soil and the climate, the necessity of perfect drainage is possibly greater in Windsor than in any other city of Ontario. The land is flat, the soil retentive of moisture, and the changes of freezing and thawing are frequent. Without properly draining the foundation it would be useless to attempt to construct and maintain good macadam or other pavement, but with a thorough system of drainage no better foundation could be desired.

Underdrainage is one of the first points to consider. In making streets it is the native soil which must really support the weight of the traffic, no matter what paving material is used to surface it. Gravel, stone, brick or asphalt are not sufficiently strong to bridge over a wet and yielding subsoil. But if this natural soil is kept in a dry state it can support any weight, and to this end underdrainage is necessary. Underdrainage of common field tile, four to six inches in diameter, should be placed on each side of the carriageway underneath the gutters, and below frost. This "lowers the water line" and secures a good foundation.

There must be surface drainage, and for this the roadway should be crowned or rounded up, covered with suitable surface material, and open gutters provided to carry away the surface water. The surface metal, of course, resists wear, but on streets which are lightly travelled the main object is to provide a cover which will prevent the water penetrating the natural soil underneath, making it unfit to support traffic. By crowning the surface of the road, water is shed at once to the side, where provision should be made to carry it away immediately in open gutters.

The amount of crown varies with the width of the roadway and character of the surfacing. For a macadam roadway, the crown ranges from one inch to one-half an inch per foot from the curb to the center of the road, the crown decreasing as the width of roadway increases.

Gutters or underdrains are useless unless outlets are provided, and care should be taken to see that these do not become obstructed. Surface drains and underdrains should have outlets into catch-basins, leading into the sewers, if capacity for storm water is provided.

Springs underneath roadways should be tapped with blind drains and the water carried diagonally to the underdrains at the side of the streets.

Main Entrances to the City.

There are portions of main entrances to the city, such as Sandwich street West, Howard avenue, Glengarry avenue and London street West, in the outlying sections of the city, where it is not advisable to pave the full width of the roadway, nor to curb it. With the foundation underdrained, and gutters made to carry away the surface water, the roadway should then be graded, leaving an excavation in the central portion a width of twelve feet and a depth of twelve inches, to receive the road metal. In this excavation should first be placed a layer about four inches thick of quarry flake stones laid closely together. On this should be placed eight inches of stone broken and coursed according to size as before specified, and thoroughly rolled. The underdrainage should be obtained by placing a row of common field tile on each side of the roadway underneath the open gutters; and diagonal drains across the roadbed at wet points. From four to six-inch tile is usually sufficient.

Sidewalks.

Sidewalks will be required in Windsor as long as the city exists and their construction in the most permanent manner possible is a part of the same principle that directs the erection of the places of business of a durable material. Planks used in sidewalks are subjected to an exceedingly severe test. They are lying close to the ground, always absorbing moisture on the underside, and are exposed to repeated changes of wet and dry. The average life of plank in this work is not more than five years until decay commences and repairs are demanded. These repairs increase annually, and walks may be and are carried for ten or twelve years, by which time the cost of repairs has almost equalled that of renewal. Every city in Ontario has laid and is laying large quantities of granolithic (cement-concrete), while nearly all towns and in fact many villages have made use of this more durable material.

In cement-concrete, sand finish, the surface coat is composed of sand and cement; while with cement-concrete granite finish (granolithic), granite, cement and sand are used. The sand finish is useful on residential streets, or other streets subjected to moderate traffic; while the granolithic forms a harder wearing surface for much-travelled streets.

The life of this class of walk is indefinite. The first walks of this material in Toronto were laid in one of the most heavily travelled sections about thirteen years ago, and are to all appearance as good as when new. Other cities have used sidewalks of cement-concrete for twenty years, which are still in excellent condition. There appears to be no reason why perfectly built walks of this material should not last half a century.

Artificial stone (cement-concrete) makes a durable, economical and satisfactory walk and this material should replace plank as rapidly as possible in your city. Of course, as with any work, care must be exercised to select the best material, and provide the best workmanship. A point frequently overlooked in concrete sidewalk construction is the necessity for perfect drainage, a matter of importance in all paving work in this country where the action of frost is so severe. Should your council desire it, I will furnish a standard specification for the construction of these walks.

Recommendations.

Summarizing the preceeding discussion, the main recommendations which I would lay before your council are as follows:—

1. That a plan of the city be prepared, classifying the streets according to traffic and requirements, adjusting the right class of pavement to each street, fixing grades, width of roadway, boulevards and location of sidewalks.

2. That the frontage tax system for street improvement be retained but so amended as to require the adverse petition of two-thirds of the property owners to annul the initiative of the council; after which the further power is given the council to perform the work on a two-thirds vote of the council. The system should be amended also so as to assess one-third the cost of all work against the general funds of the city if favorable legislation can be obtained.

3. That the ward system be abolished.

4. That less be expended in the temporary grading of dirt roadways, and more diverted to permanent work each year.

5. That broken stone roadways be laid on residential streets, the general plan to be as specified herein.

6. That vitrified brick be used on business streets in the immediate business sections.

7. That a nominal 12½-ton steam roller, and a rock crusher of at least two cords per hour capacity be purchased.

8. That plank sidewalks be replaced with cement-concrete as rapidly as possible—granolithic finish in business sections, sand finish on residential streets.

SPECIFICATIONS FOR CEMENT-CONCRETE WALKS.

The following form of specification includes the most necessary requirements for laying artificial stone walks by contract. They should, however, be varied as circumstances may render expedient :—

Location and extent of walks.

1. The location and approximate extent of artificial stone side walks to be laid under these specifications are as follows :

Removal of old sidewalks.

2. The corporation shall remove the old plank, stone, brick, and other sidewalk from the street before the construction of the new walk shall be commenced by the contractor, all such material being the property of the town, to be disposed of as the engineer may direct.

Removal of excavated earth and rubbish.

3. All excavated earth, stones, posts, stumps, other obstacles or rubbish shall remain the property of the town to be removed by the contractor to such point or points as the engineer may direct ; if not hauled for a distance exceeding one half mile, such removal to be without extra charge.

Levels, stakes and bench-marks.

4. The walk shall be laid to the lines and levels given by the engineer. No stakes or bench-marks placed for this purpose by the engineer shall be moved or effaced by the contractor without the permission of the engineer so to do.

Preliminary excavation and earth-work.

5. The space over which the walk is to be laid shall be excavated to a depth of twelve inches below the elevation of the finished walk in accordance with the plans and profiles, on fyle at the office of the engineer. Perishable or objectional material shall be removed to a further depth, to secure a firm foundation if so required by the engineer. Such excavation in excess of twelve inches shall be filled with gravel, or other material approved by the engineer, and the bottom of the sub-grade thus obtained shall be then made thoroughly firm and solid by pounding or rolling. For all excavation or filling ordered by the engineer in excess of twelve inches below the grade of the finished walk, the contractor shall be entitled to the sum of 35 cents per cubic yard.

Tile drainage

6. A porous tile drain shall be laid centrally beneath the walk, to the depth, grade, of such diameter, and carried to such outlets as are specified upon the plan and profile on file at the office of the engineer ; and tile drains for carrying surface and other water through or under the walk shall be laid as indicated upon the aforesaid plan and profile. All tile used shall be of the best quality of clay, manufactured expressly for drainage purposes, in lengths not less than one foot, and of uniform diameter throughout. All earth excavated in the laying of these drains shall be returned to the trench, being thoroughly rammed and pounded in layers not exceeding one foot in thickness, and rendered perfectly firm and solid, to the satisfaction of the engineer. When sewer pipe is required in place of common tile, such pipe shall be furnished to the contractor by the engineer ; and shall be laid in all respects to the satisfaction of the engineer.

A layer of gravel or broken stone seven inches in thickness

7. Upon the sub-grade thus excavated, drained and consolidated, shall be spread a layer of clean gravel or broken stone to be thoroughly wetted, rolled or pounded, and brought to an even surface. The layer of gravel or stone so placed shall have a thickness of seven inches ; and shall be uniformily not less than five inches below the elevation of the surface of the finished walk, having preference thereto.

A layer of concrete, four inches in thickness.

8. Upon the foundation thus prepared, a layer of concrete shall be laid in the following manner: It shall be composed of one part by measure of fresh cement, of a quality approved by the engineer, and in accordance with the specifications for such elsewhere herein described; three parts by measure of clean, sharp sand; and five parts by measure of broken stone of such a size as will pass through a two-inch ring. The concrete shall be mixed in a water-tight box placed close to the work, by first spreading evenly a layer of sand; upon this shall be evenly spread the proportionate quantity of cement and the two thoroughly mixed while dry. To this water shall be added and the whole thoroughly mixed and brought to the consistency of mortar. The proportionate amount of stone shall then be spread evenly over this mortar and thoroughly intermixed therewith. The concrete when mixed as aforesaid, shall be immediately put in place and thoroughly pounded until it has an even surface, is perfectly and uniformly solid, and is four inches in depth over the foundation and within one inch of the finished surface of the walk. Slab or flag divisions shall then be marked off, sixteen feet in area, the joints to be filled with clean sand or other approved separating material.

A layer of concrete one inch in thickness.

9. Before the aforesaid layer of concrete has set, and while it is still adhesive, there shall be laid upon it a wearing surface one inch in thickness. It shall be composed of one part by measure of Portland cement, and two parts by measure of clean sharp sand. The cement and sand shall be mixed dry, water then added to moisten sufficiently, the whole again thoroughly manipulated and mixed in a water-tight box or floor and immediately put in place. The layer shall then be thoroughly pounded, and worked to a true and even surface. Over this shall be sifted a layer of Portland cement, the whole to be neatly levelled to a perfectly smooth surface, and rolled with a tooth roller to make a surface that will not be slippery. This surface layer shall be cut into sections, the joints to correspond exactly with those of the first described layer of concrete, the edges of the walk to be rounded, and the whole finished in a neat and workmanlike manner.

Temporary curbs to be supplied by contractor.

10. Before any concrete is placed in the walk, temporary curbs, of 2 x 6 pine, with edges dressed so as to be perfectly straight, shall be firmly and accurately placed along the outer edges of the walk, to be removed after the walk has hardened; these curbs to be furnished by, and remain the property of the contractor. When the curb is removed, the vacant space must be filled with good soil, and any sodding disturbed in so doing must be carefully restored.

Total thickness and slope of walk.

11. The total thickness of the walk, including foundation layer, concrete layer, and the wearing surface, shall be uniform throughout, and shall have a slope towards the roadway of $\frac{1}{4}$-inch to the foot, unless otherwise required by the engineer.

Cement.

12. All cement used in the work must be of some well and favorably known brand, and shall be approved by the engineer. It shall be delivered in barrels or equally tight receptacles, and must be protected from the weather by storing in a tight building or by suitable covering, the packages to be placed on boards or flooring raised above the ground. All cement rejected by the engineer shall be conspicuously marked "Condemned," and shall be immediately removed from the site of the work. Should any cement so rejected be thereafter used in the walk, such sections as may be required by the engineer, shall be immediately torn up by the contractor, and replaced with cement of proper quality, without extra compensation. The supply of cement must be so gauged that a sufficient quantity will be kept on hand to allow ample time for testing and examination by the engineer, without delay to the work of construction; the cement to conform to the following tests, and such others as the engineer may require:—

(*a*) At least 90 per cent. shall pass through a sieve having 10,000 holes to the square inch.

(*b*) Pats made of neat cement, with thin edges, on pieces of glass, covered with a damp cloth, and allowed to set in air; then placed in boiling water 48 hours, must not show expansion cracks, distortion, nor curling of the thin edges.

(*c*) Samples of cement shall be made into the consistency of a stiff mortar, pressed firmly into moulds, and covered with a damp cloth, then allowed to set in air 24 hours, then in water three, and seven days. When in water three days, six samples shall show an average tensile strength of 300 pounds per square inch; when in water seven days, six samples shall show an average tensile strength of 450 pounds per square inch.

13. The stone and sand shall at all times be subject to the approval of the engineer, the sand to be clean, sharp and silicious. Sand and stone.

14. At street crossings, lanes and private driveways, the walk shall be so rounded, placed, and at such an elevation as to give a convenient passage for vehicles, to the satisfaction of the engineer. The surface layer of concrete shall be 1½ inches thick, composed of equal parts by measure of cement and sand, and marked into diamond shaped blocks by lines crossing the walk diagonally six inches apart. The edges shall be rounded, and faced to the bottom of the concrete with the cement mortar used for surfacing the walk. At all street crossings, and elsewhere if so desired by the engineer, the edges of the walk shall be protected by a curbing of 4 x 6 cedar, placed in a permanent and durable manner, flush with the surface of the walk. Street crossings, lanes and private driveways.

15. The contractor, in doing the work, shall excavate or fill in around trees in a careful manner so as not to injure the said trees ; and all gratings, areas, tree-spaces, or other interruptions to the walk shall be regarded as continuous in the payment of the walk. The repairing or building up of area walls or other supports for gratings shall be performed and the material supplied by the contractor, as the engineer shall direct. Trees, tree-spaces, gratings, areas, etc.

16. No concrete shall be laid in wet or freezing weather. Laying concrete in wet or freezing weather.

17. Care must at all times be taken to prevent injury to waterworks stopcock-boxes, down pipes, door sills, steps, areas, gratings, or other appliances which may be under, project into, or pass through the walk, and the pavement shall be carefully and neatly filled around such appliances. When required by the engineer, all gratings or covers furnished the contractor shall be properly fitted into and conform to the surface of the walk. Prevention of injury to waterworks and other appliances.

18. The contractor shall be bound to maintain the walks and crossings in perfect repair, free from all cracks and defects, for the term of five years from the date of completion thereof, and should the contractor fail to do so at any time during the said term, the engineer may cause the necessary repairs to be made, retaining the cost from moneys due, or becoming due to the said contractor on this or any other contract between the town and the contractor, or may recover the same from the contractor, or his sureties in this contract, as money paid at their request. The certificate of the engineer is to be final as to the necessity of repairs and amount expended upon them. Contractor to maintain walk in perfect repair for five years from date of completion.

19. Care shall be taken at all times not to interfere with business or travel more than is absolutely necessary for the faithful performance of the work. The contractor shall make suitable and adequate provision for the safe and free passage of persons by or over the work, as may in the opinion of the engineer be necessary, and must confine himself to that half of the street on which the sidewalk is being put down, leaving the other half for the regular traffic. Interference with traffic.

20. At all times during the progress of the work care must be taken not to unnecessarily injure or destroy private lawns, nor boulevards adjacent to the walk. On the completion of the work all surplus or refuse material must be immediately removed from the street by the contractor. If not removed within forty-eight hours after notice in writing so to do from the engineer, it shall be removed by the engineer at the contractor's expense. Care of private lawns, boulevards, and removal of surplus material.

21. The contractor shall, during the progress of the work, use all proper precautions by good and sufficient barriers, red lights, or watchmen, for the prevention of accident, and he will indemnify and save the corporation of the town of ..... from all suits and actions, and all costs and damages occasioned by the negligence or carelessness of the contractor or his agents, or employees. Liability in case of accident.

22. The contractor or his duly authorized agent or foreman shall at all times while work is in progress, be on the ground, and instruction given by the engineer to such agent or foreman shall be of the same effect as if given to the contractor. Contractor or his agent to be on the work while in progress.

23. The word engineer, where and whenever used herein, refers to the engineer of the town of ..... or his authorized assistants, or other person appointed by the council of the town of..... to have charge and oversight of the work. Engineer defined.

24. The decision of the engineer shall be final in case of ambiguity of expression in the specifications, or doubt as to the correct interpretation thereof. Interpretation of specifications.

Disorderly or incompetent employees.

25. Any disorderly or incompetent person or persons who may be employed on the work shall be removed when required by the engineer, and no person so removed shall thereafter be employed upon any portion of the work.

Defective work.

26. Any defective work that may be discovered by the engineer before the final acceptance of the work or before final payment shall be made, shall be removed and replaced by work and materials which shall conform to the spirit of the specifications; failure or neglect on the part of the engineer to condemn or reject bad or inferior work or materials, shall not be construed to imply an acceptance of such work or materials.

Payment of contractor.

27. The contractor is entitled to receive 90 per cent. of the value of any portion of the work completed under these specifications, at the end of each fortnight, such completion being certified by the engineer, and by the chairman of the board of works. At the expiration of sixty days after the acceptance of the work, the whole of the moneys accruing to the contractor under these specifications, excepting such sum or sums of money as may be retained under any of the provisions herein contained, and such sums as may have been paid in the form of partial payments upon the fortnightly estimates of the engineer.

Necessary notices.

28. All necessary notices to waterworks, gas, electric light, telephone, or telegraph officials owners or occupants of property, or other interested parties shall be given by the contractor.

Payment of workmen.

29. The contractor shall punctually pay the workmen who shall be employed on the work comprised in these specifications, in cash current, and not what is denominated as "store" pay. And final payment for the work shall not to be made until satisfactory vouchers are furnished the engineer by the contractor showing all wages to have been paid.

Unforseen obstruction delay or hindrance.

30. All loss arising from unforseen obstructions or difficulties encountered in the performance of the work under these specifications, or from delay or hindrance from any cause during the prosecution of the same, shall be sustained by the contractor.

Commencing the work.

31. The work to be done under these specifications shall be commenced on such day and at such place or places as the engineer may direct. Failure so to commence without good and valid reason therefore, will be authority for the engineer to declare the contract forfeited. Nor shall the contractor commence work on any street without the order of the engineer in writing so to do.

Forfeiture of contract.

32. The Board of Works reserves the right to declare the contract ferfeited at any time it should appear to the engineer that the work, or any part thereof, is being unnecessarily delayed by the contractor, or that the contractor is wilfully violating any of the conditions of the contract, or is executing the same in bad faith.

Removal of rejected work or material.

33. In case the contractor should refuse to remove or replace any rejected work or material within forty-eight hours after written notice, such work or material shall be removed by order of the engineer at the contractor's expense.

Tender to be accompanied by a cheque for $100.

34. Each tender must be accompanied by a certified cheque for the sum of $100, as a guarantee of good faith on the part of the person tendering, all such cheques to be retained in the possession of the town treasurer until the contract and bond for the performance of the work are signed and fyled with the engineer.

Bond for $1,000 required.

35. Before the contract shall be signed, or the work commenced, the contractor shall furnish a bond for the sum of $1,000 for the satisfactory completion of the work, signed by two responsible sureties, and approved by the chairman of the board of works.

Right to reject tenders.

36. The right to reject any or all tenders is reserved by the town of ..... and the lowest or other tender is not necessarily accepted.

Form of tender.

37. Tenders for the work under these specifications must be made on the forms for this purpose, which may be had on application to the engineer.

Receiving tenders.

38. Sealed tenders, endorsed "Tender for Artificial Stone Sidewalk," will be received by the engineer up to noon, the ..... day of ..... next.

A STREET IN BARRIE.

A broken stone (macadam) pavement well laid and properly cared for.

IN MERRITON.

IN MERRITON.

Street macadamized in 1898.

DRAIN THE ROADS !

DRAIN THE ROADS !

DRAIN THE ROADS !

A knowledge of how to drain the roads most perfectly is the basis of successful roadmaking.

ARCH CULVERT OF CONCRETE.

ARCH CULVERT OF CONCRETE.

THE LAKE SHORE ROAD.

One of the oldest roads in Ontario, once an Indian trail, but now improved (?) by statute labor.

IMPROVED ROADS LEAD TO IMPROVED FARMS.

WELL NAMED.

"Canal Street," Ottawa.

ON THE OLD TALBOT ROAD.

ANNUAL REPORTS

OF THE

CHEESE AND BUTTER ASSOCIATIONS

OF THE

PROVINCE OF ONTARIO

1898.

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CHEESE AND BUTTER ASSOCIATION

OF

EASTERN ONTARIO.

ANNUAL MEETING.

The twenty second annual meeting of the Cheese and Butter Association of Eastern Ontario was held in the City of Kingston on the 10th, 11th and 12th of January, 1899. The commodious and handsome main auditorium of the City Hall was placed at the disposal of the Convention, and all the sessions were held there. The Mayor, Corporation and leading citizens of Kingston did all that could be desired to add to the pleasure and comfort of the visitors, the complimentary banquet to the members of the Association being one of the choicest receptions yet tendered that body.

THE PRESIDENT'S ADDRESS.

By D. Derbyshire, Brockville.

I now have pleasure in opening the twenty-second annual convention of the Cheese and Butter Association for Eastern Ontario in good old Kingston, famous as a military point and as the centre of education for Eastern Ontario. Your churches and public buildings are all that could be desired, your merchants and manufacturers are among the foremost, and our Dairy School is situated here. I say again we are delighted to meet with you, and I believe this will be the most important meeting we have ever held. We have lost by death Mr. E. J. Madden, who so worthily represented this division on our board last spring. We all deeply regret his early demise, and tender our heartfelt sympathy to his widow and sorrowing friends. It will be your duty to elect a successor at this meeting. We have also lost Prof. Ruddick, by removal. We all regret this, for we had all learned to admire the very excellent work done among us, but we have Prof. Hart in his place also doing excellent work. Another year has passed into history, and I feel proud of what we have accomplished in 1898, with our seven instructors, who have visited all our creameries and cheese factories, giving practical instructions, holding meetings and in every way advancing the interests of our dairymen.

Our Creamery Butter.—Our creameries have done well, and each year we have made steady advancement, not only in the quantity made, but also on the more important point of quality. Our creamery butter has attained a high standing, not only at home, but also on the British market, and we can safely extend our operations, because we have an unlimited market for all the fancy fresh creamery butter we can make. We feel proud of our record. We exported in 1894, 32,055 packages; in 1895, 69,664 packages; in 1896, 157,321 packages; in 1897, 220,252 packages; in 1898, 280,000 packages. We want to make 1899 at least 400,000 packages, so that we may receive $1,400,000 more for creamery butter than ever before. Our work in connection with our creamery business has been very encouraging, and we are sure that all will unite in pushing this important branch of our work to the highest point of perfection.

Our Cheese.—While our make has not been quite so large as in 1897, still we have improved the quality, and have had a fairly successful season, and I feel sure we would have had a good season and prices fully one cent higher throughout the season had not one of our exporters tried to do all the business and continually undersold everybody on the British market. Our exports in 1896 were 1,726,726 boxes; 1897, 2,101,985; 1898. 1,900,000, and we have about the same quantity on hand on the first of January, 1899 that we had one year ago—about 300,000 boxes, and our market is firm. So we are sure to have a good opening, providing we can secure the co-operation of all our dairymen not to make any April cheese. We did well last spring, very few early cheese being made, and we do hope this will be continued. We can make all the cheese between the first of May and the first of November that can profitably be handled, and we can make fancy goods, and I do trust we will make fine creamery butter the other six months and equalize our output. From present prospects there is every promise that 1899 will be the best season our dairymen have ever had, a larger make, finer quality and better prices, and I do hope all will work earnestly with this object in view. The first thing I want to bring before you is

Cheaper Production.—Cheaper production is being studied by our merchants, manufacturers and business men as never before. I do hope all our dairymen will study this question, have their stables improved so that the cows can be kept comfortable, with proper ventilation, improve their dairies, weeding out the poorest each year and adding nothing but the best; build silos and grow plenty of corn, so they will have plenty of good cheap food, milk regularly and for ten months at least each year; and if they do so the coming season will record the greatest prosperity among our dairymen we have ever seen, on account of our cheapening the cost of production, sending more milk and of a better quality from each dairy and receiving better prices for the same.

Better Makers.—While we rejoice at the large number of really first-class butter and cheese makers now in our country, still we must all admit that a large number of quite ordinary makers are being engaged from year to year—some because they offer to work cheap and others have friends who assist them in securing positions as makers. I would strongly urge all to attend one of our dairy schools and thoroughly qualify themselves, so that we will have none but the very best makers in any of our factories.

Better Curing-rooms.—Possibly one of our weakest points in this country in connection with the production of fancy cheese is our poor factories and curing rooms. Prof. Robertson will take this subject up, and I feel sure we shall all be benefited, and when we go home we will take hold of this question, as its importance deserves. We must positively have better curing-rooms. Our market is demanding a mild, cool, rich, silky texture and fine flavored cheese, that has not been heated in our curing room or in transit. We want to hold the first place as producers, and we can only do this by having our curing rooms up to date. I feel sure our factorymen will show their usual energy in improving, not only the curing rooms, but their factories as well. Then why not see to beautifying the grounds and planting shade trees. Look over everything, and see that you can truly say "I am ready to receive milk," which means that your factory is in first-class condition, with curing-room so you can control the temperature, drainage right, and that you have a competent man in charge so that a fine article can be turned out without any hesitation. The patrons should see to this, and not patronize any factory that is not right up-to-date.

Improved Transportation.—While our Government, under the able direction of the Hon. Mr. Fisher, has done well to give us refrigerator cars for our butter, still we want this greatly enlarged and improved. We must have well built, well ventilated cars for our cheese. A great many thousand cheese were injured in transit this last season. I do hope we can make arrangements with our railways to improve this important service, so that we can be assured of the safe and speedy delivery of our butter and cheese If we can secure the safe delivery of our goods this coming season, it will certainly be a great step in advance, and I do hope the Hon. Mr. Fisher will interest himself in our behalf.

Selling Butter and Cheese.—Very little requires to be said on the subject of selling our butter and cheese, for most of our salesmen sell regularly now ; but I would like to say again that we have built up our reputation by having our goods go forward every week, while they are fresh and in the best possible condition, and I trust no one will be foolish enough to hold or speculate, but see that their goods go forward in the very best possible condition weekly. The factories which have followed this practice are ahead financially, while they are gaining in reputation and doing good to our whole country. The Hon. John Dryden has continued his assistance and co-operation, for which we are very thankful. Prof. Robertson has rendered valuable assistance during the past year ; our dairy schools are doing efficient work in preparing our young men for taking a first place in their work, under the able direction of President Mills, so we have every encouragement to press forward for a good name and a high quality of Canadian goods. Let us plan and labor, agitate and educate, until all our people set seriously about a thorough and lasting improvement in methods. I am pleased to say our dairymen in Eastern Ontario are all united, and are working harmoniously together, and we hope this will continue. I have to report that our Board has worked earnestly, our secretary has been energetic and performed his duties well, our treasurer has guarded the funds carefully, our instructors have vied with each other in the performance of their arduous duties, so I can confidently say we have done our full duty.

I thank the merchants and business men of Kingston for the very generous way you received our secretary when making final arrangements for this convention, and the mayor and citizens for the royal manner in which we have been received to-day. Once more let me urge united action in every department, the patrons all delivering more milk from each farmer of a better quality, and at less cost ; our makers having attended one of our dairy schools, work earnestly to make a finer quality of butter and cheese, and our proprietors putting their factories in the best possible condition for receiving milk. This Association will do all in its power to assist you, and we will have the great pleasure at our next annuel convention of recording 1899 the most prosperous season our dairymen have ever had. I wish you one and all a happy and properous New Year. (Applause.)

COMMITTEES.

The following committees were then appointed :

Business : His Worship the Mayor, of Kingston, Messrs. R. G. Murphy and L. L Gallagher.

Nominations : James Whitton, J. R. Dargavel and Wm. Eager.

Finance : T. B. Carlaw, John McTavish and Edward Kidd.

Legislation : Wm. Eager, Henry Wade and R. G. Murphy.

Dairy Utensils : G. G. Publow, L. A. Zufelt and J. A. Kerr.

Judge of Butter and Cheese : Prof. Hart.

ADDRESSES OF WELCOME.

Ex-Mayor E. J. B. Pense, in the absence of the mayor, was invited to preside temporarily. He said he was glad as chairman of the Kingston School of Mining and Agriculture to extend a cordial welcome to the Association, and also to welcome them in behalf of the city, for the citizens of Kingston valued the energy, enterprise and usefulness of dairy organizations of the Province. There was a time when the west almost despised the east, in an agricultural sense. As the western dairymen looked upon those hills

of limestone and granite he would ask "Can any good thing in our time come out of Frontenac?" And verily great things had come out of the county—first class cheese and Al butter. Leeds, on the rugged front of the St. Lawrence, had long lead the dairy counties of the Province, and now Frontenac was pressing her for first place. The Kingston Dairy School had been successful, and had prepared the way for a royal welcome to the Association. All classes had united to give a hearty reception to the convention; the City and County Councils had united with the Frontenac Cheese Board to prove their good will and hospitality. Mr. Pense then introduced Dr. Ryan, the mayor, as a worthy example of the farmer lad who could make his mark in the city and in a learned profession, and who would assure them that the civic latch-string was, indeed, on the outside.

Mayor Ryan spoke briefly but heartily. As mayor of the city he had much pleasure in welcoming the Associaton. He was indeed a son of the soil and was proud of it. During the few years since he had left the old homestead great changes for the better had taken place in the dairying business, and these changes were almost entirely due to the good work of the Butter and Cheese Associations, backed up by the Provincial and Dominion Governments and a progressive press. The farming industry was an elevated one to those who practised it well; and that branch of agriculture called dairying had done much to lift up the calling in the social, business and intellectual scale. During the last twenty years dairying had changed the face of the country around Kingston. After a jocose reference to the friendly eye the police would have upon the visitors, the the mayor again said he welcomed the members of the Association, who had taught their fellows that when grain failed as a staple crop dairying was the salvation of the country in an agricultural sense.

Ald. Donnelly supported the mayor in kind assurances that the Association was welcome, and would be treated to all the hospitalities of the city.

Mr. A. Cranston, of Elginburg, as a representative of the Frontenac Cheese Board, joined in the greetings already given. The dairymen of the county felt grateful to the Association for again visiting Kingston, after six years. He knew that the entire district would get a stimulus and much educational profit from the meetings.

Mr. L. L. Gallagher, of Wilton, also spoke on behalf of the Frontenac Cheese Board. The Kingston district was now a leading cheese-making section, and he thought just getting ahead of the famed Leeds or Brockville section. (Laughter, and "Not just yet" from the President.) All the local men had decided to make the present meeting one of the best yet held.

The President in a few words thanked the speakers for their cordial welcome. It was a cheering opening, and presaged one of the best conventions yet held in the Dominion.

CHEESEMAKERS' TROUBLES AND THEIR REMEDIES.

By Prof. Dean, of Ontario Agricultural College, Guelph.

One of the boys at the College last fall was wearing upon his breast a button bearing the following words: "I have troubles of my own; don't bother me with yours." That button has suggested the title of my talk this afternoon. But while I will speak of troubles of cheesemakers I shall also give some remedies for these troubles. As I came along on the train this morning from the west, and swept along the beautiful country skirting the lakeside, I was struck with the magnificent view I had at times as I looked through the car window. There was the shimmering water of Lake Ontario, as clear as crystal, reflecting back the bright sunlight, and in the distance looking as pure as glass. Yet now and then came bits of steam or smoke, which hid for a little my view of the grand spread of water. Looking landward, I saw comfortable farms, and prosperous towns and villages through which we passed. Now the steam from the engine would hide the view, and again the woods would come between us. These obscurations by steam or smoke

reminded me of the troubles that the maker of cheese or butter encounters in his work I also observed at the further side of the lake a bank of clouds, which at times made a beautiful picture; but although the clouds were mostly bright, they had some dark spots. These represented to my mind the dark spots and clouds in the business when we look across the other side of the water.

One trouble that the cheesemaker meets with is the difficulty of getting clean, pure milk. Although so much has been said and written about the dirt and impurity of milk, I am sorry to say that this trouble still exists in too many quarters. The only way to overcome this trouble is by a patient and persistent process of education. This Convention will materially assist in getting cleaner and purer milk for our cheese manufacturers. The average patron does not take so kindly to education as one would suppose, but by keeping steadily at it, endeavoring to get them to walk in the right path, we shall by dint of continual prodding and urging get them to do right. Our cheesemakers and butter-makers would undoubtedly do better work if they had better milk to deal with. I noticed this morning when looking out of the car window while near certain towns that there were many bits of steam coming out of establishments very close together. That represented the small factories. Some of our factories are so small that there is hardly any place for the steam to come out of. It is a serious fact that many of our cheese factories are too small for proper work to be done in them. What is wanted in this Province to-day is, not more cheese factories, but larger and better equipped establishments. (Applause.)

In connection with this question of small and poorly equipped factories there has arisen a great injustice, especially in Western Ontario. Some of our makers have had to pay for losses in cheese for which they were no more responsible than you or I, who have never even seen the factories. Where there are bad buildings, poor drainage, and impure milk coming in it is not right to saddle that loss upon our cheese or butter makers. (Applause.) The owners and patrons should be held to account for it. I have always advocated true co-operation, which means the sharing of both gains and losses by all concerned. One of the graduates of our Dairy School has been asked to pay $600, not altogether due to his neglect or incompetence, but because the material he had to deal with was not first-class. That is not fair. Troubles of this nature ought to be met at the outset, and we ought to try and devise some practical remedy; and the remedy I would suggest is that the losses ought to be equally borne by all concerned. It has come to such a pass in one portion of the Province that a number of cheesemakers have signed an agreement that they will not be responsible for any losses except those which are due to their neglect. I shall watch with interest the outcome of this plan next year.

Another trouble that our cheesemakers have met with in Western Ontario is that they have difficulty in getting the milk to properly coagulate. One of the students, who is now attending the Guelph Dairy School, had to use eight or nine ounces of rennet in order to get the milk to coagulate, where otherwise from two and a half to three ounces would have been enough. We got a sample of that milk, but it soured before we could properly treat it, and we were therefore unable to solve that particular difficulty. In some cases, however, I fear that patrons of factories are using something to keep the milk from souring. The most common thing used for keeping farm-house milk is baking soda; but while it is comparatively harmless, like other alkalies it will prevent the milk from easily coagulating. But even were patrons putting nothing in the milk to prevent it from souring, the maker will have trouble, perhaps with his rennet. Again, this alkaline condition of the milk may be due to the cow eating certain food in the stall or pasture. I have not been able to definitely prove this, but cases have been known in Germany and investigated by Prof. Fleischman. He has found that such milk has difficulty in coagulating when rennet is applied. When we find the milk in such condition we must put something into it to try and remedy the matter, and any limy salt such as calcium of chloride will help to bring about a normal condition, and so overcome the difficulty. We need more investigation, however, before we can be certain. Too much water in the milk will also cause difficulty in coagulation. Rennet cannot act properly upon the casein

where there is too much water present, and so a weak curd is developed. In rainy weather the maker usually has difficulty in getting a firm curd, because of the rainwater which gets into the milk.

But too often the trouble is with the rennet. We have been making some experiments this year with rennet powder instead of the rennet extract or fluid form. The rennet powder is no more expensive, although perhaps there is more trouble required in preparing it for the milk. Then there is less cost in freight, and that is a considerable item in a large factory. We have found the rennet powder to give good results in coagulating milk in cheese making; in fact it is equally as good as Hansen's extract. There is also less risk of loss from accident such as breakages, etc, where the powder is used instead of the fluid extract.

The difficulty of controlling the temperature of the curing-room is one of the troubles that cheese-makers must face. I think, however, that this is not so formidable as most people think. We have been experimenting during the past year with two methods of controlling the temperature of the curing-room, and in connection with the Kingston Dairy School Mr. Ruddick made some experiments along similar lines, namely, with ice and with the sub-earth air duct. Both of these plans have given entire satisfaction to us at Guelph, and I believe a like result was experienced at the Dairy School in this city. For the proper curing of cheese it is necessary to keep the temperature at from 60 to 65 degrees If the temperature ranges from 70 to 75 degrees the fat will exude, and the cheese will be greasy and undesirable. The western representative of Hodgson Bros., of Montreal, who examined the cheese made under these different conditions of temperature, said that he would be prepared to pay from one half to a cent a pound more for those cured at from 60 to 65 degrees as compared with cheese cured at from 70 to 75 degrees. In this case, remember, the cheese were made out of the same milk, but were cured at different temperatures. Too many cheesemakers have not proper control of the temperature, for if the temperature runs from 70 to 85 degrees, as it too often does, the fat runs out of the cheese on the shelves and down to the floor. Prof. Dean then proceeded to describe the sub-earth duct put in at the College Dairy, a full description of which is given in an address made at the Cheese and Butter Association of Western Ontario, which will be found in the reported proceedings of that gathering, bound with this report. He then proceeded: We have also had good results with ice for controlling the temperature of the curing-room. The trouble with ice, however, is the labor of taking it into the curing-room, and getting the water away. I do not know whether the average cheesemaker has time to take in the ice or not. If he can find time, the ice will give good results. We placed our ice on a pan. Some use a box, which has an opening near the floor, and find it to work satisfactorily. We have used both methods, and with cheese cured by the air duct we found some difficulty with mould on the cheese. Mr. Ruddick found more mould on the cheese from using the ice. Does mould really deteriorate the cheese?

The PRESIDENT: Yes; but it does not interfere with the quality. However, cheese should have a slick, clean appearance for the buyer.

Prof. DEAN: But do not the cheese often mould while in the dealer's hands? Is there not too much said about cheese moulding, to the prejudice of the makers? In the case of the cheese which mould under the conditions I have spoken of we found that the stripping of the bandages gave a nice, clean-looking cheese for the counter. I really think there has been too much stress laid upon the matter of mould in the curing-room We used a formalin solution for mould. We find that a ten per cent. solution of formalin will prevent mould for eight or ten days; but it is not possible for the maker in a large factory to spray with this solution every week or ten days.

There is another trouble that the cheesemaker has been meeting with lately, and that is tha the cheese will rapidly deteriorate in quality when the market weakens in price. (Laughter and applause). That is a difficulty that we at the College cannot settle for you. If you here can solve that question satisfactorily, and keep up the quality of the cheeseon hand when market prices fall, you will have done something that will cover this convention with glory.

Mr. D. M. Macpherson: Make the market good.

Prof. Dean: We teachers and makers cannot regulate the market, but we can keep up the standard of our product. Now, I do not want to say anything against the cheese buyers. They are as a rule a lot of splendid fellows. But I think it would be more honest for buyers to say: "We cannot take that cheese at the price we offered, for the market has gone down, and we would lose money; the cheese is all right, but we cannot afford to handle it at the original offer." Do not give a maker's cheese a bad reputation when it is no really deserved. I have heard of one or two cases where the buyer has gone into a factory and culled the cheese and selected only a few boxes. He has gone back again and has been unable to pick out the cheese he had previously selected a short time before. It would do away with a great deal of the trouble we have to-day if the buyer, the maker and all concerned would deal more frankly and honestly with each other. For be it known that the maker sometimes has his failings in a commercial way. In some cases rejected cheese have been put in with the shipment, and have been discovered only when the buyer had overhauled his purchase.

In the season of 1897 cheesemakers in several parts of the Province met with difficulty in the cheese mottling. We got one sample of cheese from the eastern part of Ontario in November of that year, and got a starter from it by grating the cheese very fine and putting it into pasteurized skimmilk when properly cooled. We took two vats, and put the same kind of milk in each, adding to one of them some of the starter made from the mottled cheese. We have some of that sample of cheese, and it would be almost impossible to detect the mottling, as the coloring has almost entirely gone. We have another made on February, 1898, from the same kind of starter, and the mottling is very marked. We do not know how that happened, but think that the cheese made in November, 1897, in some way contributed the germs to the starter, which was used in making the February cheese.

During the past season our experimental work in the dairy began on the 4th of April and concluded on the 15th of September. During that time we made some forty-five experiments relating to this question of mottled cheese. We also had cultures made from this mottled cheese, but none of the cultures in the laboratory produced the mottling. Dr. Connell, who is present at this meeting, says that he has discovered the germ that causes the mottling, but our bacteriologists at the College have not so far been able to find it. If we take a sample of mottled cheese and grate it finely, put it in some skimmilk and make a starter of it, we will be able to produce mottled cheese by using that starter. There are some curious variations, however, even with the same starter. On April 6th we used the starter, and the cheese had a bad flavor and were badly mottled. On April 7th we used the same starter, and we had a poor flavored cheese but no mottling. That was a characteristic of this mottled starter; sometimes we had poor cheese, and sometimes we had not; sometimes the flavor was bad, and sometimes it was not so bad; while again we would find both bad flavoring and mottling. On April 9th we had both bad flavor and mottling. Another peculiarity we noticed in the cheese made from this starter was that the cheese made on April 21st was badly mottled by May 7th—that is, the mottles appeared in sixteen or seventeen days. The mottles usually appear in two or three weeks. On June 10th and July 13th the cheese was again examined, and was still badly mottled, but on August 12th the mottles had entirely disappeared. Now, if you come across mottling in your cheese you may know what to expect—you will find considerable variation in its operation.

Mr. D. M. Macpherson: What class of mottling was it—a rust?

Prof. Dean: No; hardly a rust. The coloring almost entirely disappears in time and early in the stage you have throughout the cheese white and yellow spots. In 1897 many factories were badly affected by mottled cheese. I have not heard of any in 1898, although I requested a number of buyers and makers to report to me any cases that came under their observation. I might add that the flavor of mottled cheese is peculiarly unpleasant. We tried different kinds of coloring in order to see if the fault lay with them. We have two classes of coloring matter—those of a vegetable nature, such as annatto,

and those of a mineral character, like that derived from coal tar. We requested one firm to send us some coloring matter of a purely vegetable kind, but we found that even with this particular sample the cheese was as badly mottled as in the case of the other coloring matter we had been using. So it appears that there is no difference whether one uses vegetable or mineral coloring. I have, however, found it difficult to get dealers to supply mineral coloring matter. Another peculiarity about this mottling and bad flavor is that we have never found it in connection with white or uncolored cheese. We have taken a vat of milk and put the coloring in it with the starter, and have put the starter in another vat with the same kind of milk but no coloring, and in all our experience we never found a case where the white or uncolored cheese had mottled. I hope the time will soon come when people will not use colored cheese. The custom of coloring cheese is not a clean practice; every true friend of dairying should try to stop this phase of cheesemaking.

The PRESIDENT: We will make just what the people demand, if there is money in it. (Laughter.)

Prof. DEAN: I have come to some conclusions regarding this matter of mottled cheese and they are as follows: (1) I believe that the discoloration is caused by some germ—a low form of life which attacks the pigments added to the milk to color the cheese. (2) That the kind of coloring matter used—whether vegetable or mineral—has no effect upon the mottling; that the germ will attack cheese treated with either kind. (3) That white cheese, or that to which no coloring matter has been added, is not affected by mottling so far as our experiments have gone. (4) That pasteurizing milk will not prevent this trouble. We made several experiments with pasteurized milk, and found that the cheese were mottled when the particular starter referred to was used, just as in the case of the unpasteurized milk. (5) In every case where we got a starter from the whey tank the mottling appeared. The ordinary whey tank is usually a stinking, dangerous affair. We found it so in our own case, I have to confess; and this year we got an improved elevated whey tank made of boiler-plate. I think there is a close connection between whey tanks and mottled cheese. Where the whey is taken home in the patrons' cans, and the milk brought back in them, germs from the whey get into the milk, which act as a starter. The very obvious moral is that whey should not be taken back to the farm in the milk can. (Applause.) (6) There appears to have been something special in the year 1897—the weather or other conditions of the season appeared to be favorable for the production of this particular trouble. This year we have been practically free from mottled cheese. We may meet it again, and so it is well to know all about this particular trouble, so as to deal with it as thoroughly as possible. The first time the cheesemaker notices any discoloration in his cheese he should take them out of the curing-room and scrub the shelves and floor of the curing-room, and thoroughly disinfect the premises. Use every endeavor to try and head off the difficulty.

I have told you some of the troubles met with by the cheesemaker in his work, and have also given you the remedies for some of them. I shall now leave the matter with you for discussion. Let science and practice go together in overcoming these difficulties. (Applause.)

Dr. CONNELL, Bacteriologist of Queen's University, Kingston, was invited to give his opinion regarding the discoloration of cheese, and said: With regard to the question of mottled cheese referred to by Prof. Dean, I would say that last year at Lindsay I obtained from him a sample of the cheese spoken of. On coming home I made a culture from it, and obtained therefrom a number of forms of bacterial life, and with these made experiments with cheese at the Dairy School. We took a culture, introduced it into milk, made a starter from it, put that into a small experimental vat, and the result was a cheese revealing mottles. Unfortunately the culture tubes were accidently exposed to the sun, and were ruined for experimental work. Otherwise I would have been able to show you the germ here to-day. From the nature of the mottling and its general history it is undoubtedly a bacterium. I think also that the difficulty arises from the cause attributed by Prof. Dean—it comes of the infection of the milk through the whey brought home in the milk cans. The bacteria should produce the same flavor in the white

cheese as it does in that to which coloring matter has been added. I cannot see how the process could be set up in the coloring matter in the cheese and not in the case of uncolored cheese.

Mr. D. M. Macpherson: In my opinion this discoloration of cheese arises from improper manipulation. When the curd is exposed to the air, after the whey is drawn and it is run together, and allowed to rest on a cloth, and the fibre of the cloth presses out a large amount of moisture, and some being dry and some being moist, there is an unevenness, and so discoloration occurs. In visiting Scotland a few years ago I found that they had a good deal of this discolored cheese. I advised them to do away with the cloth, and arrange to keep the moisture from being forced or evaporated from any particular portion of the curd, and the matter was remedied. My practice at present is to preserve a uniform moisture throughout all the particles of curd, and thereby have an equal color.

The President: I believe the best way to do in this matter is to have the cheesemaker watch closely all the patrons, and advise them as to the importance of keeping the milk cans clean, and giving them personal hints as to the care of milk, etc. He should see that his premises are as far as possible models for his patrons;—that the drainage is good, and that the whey tank is kept in good order. That will not only do away with this discoloration, but with many other troubles of which so many now complain. Then no cheesemaker will need to wear a button telling the world that he has troubles of his own. (Laughter and applause.)

FEED AND MANAGEMENT OF DAIRY CATTLE.

By J. H. Grisdale, B. Agr., Central Experimental Farm, Ottawa.

The action of the Eastern Dairymen's Association in giving "Feed and Management of Dairy Cattle" a place on their programme shows in a small degree the great importance of the subject, and its importance lies in its being the chief of the various sciences which make up this, Canada's greatest industry, dairying. I called it a science, but while requiring all the exact knowledge inferred in that term it further requires the skill and fine sense of an artist to make perfect dairy farmers upon whom and the management of their herds depends the whole dairying industry. Though much attention has been given to this subject by farmers' institutes and conventions in every part of this country and the neighboring republic, there is yet much room for improvement—much to learn.

I have, during the last two years, had the opportunity of visiting a great many dairy farms, and the principal experimental farms and colleges throughout Ontario, Quebec and some of the most important dairy States in the Union. I shall, therefore, let part of my address be a summary of the facts gleaned and suggestions offered me by the different places visited.

As the prime force in a dairy farm, I might say first a few words on the manager. The qualifications of a good feeder and manager of dairy cattle are various. He must in the first place have a keen interest in his cattle; he must be able to control his temper and he must be liberal to a degree. In short, he must be almost an ideal man, as all the first-class dairymen of my acquaintance seem to be.

Turning now to the cause of all these dairymen's conventions, the milch cow, I should like to direct your thoughts to the season best suited for having the cows "come in," or calve. I know that the general rule is for spring calving, but the best time is the fall. There are many reasons in support of this statement. A great many experiments have been carried on during a number of years in various parts of the world, and these all go to show that from fall-calving cows about twenty-five per cent. more milk is obtained than from spring-calving. The reasons are obvious. During the winter the

cow is free from drouth, heat and flies, and her yield is thus not affected when right in the flush of her milk as is too often the case. Then the spring grass coming toward the close of her period of lactation serves as an inspiration to her wearying powers, and greatly increases the waning milk flow. Other points to which I would call your attention as favoring the adoption of fall calving are: there is usually more time on the farm to attend to the cattle, calves are more economically raised, since by the time the spring grass shoots up they are ready for it, and are in good condition the next winter to begin the duties of maternity.

The care of dairy calves is probably the most influential factor in the development of a good dairy herd. Keep the calves in light, airy quarters. Many farmers do not let their calves touch the cows; this is a somewhat debatable question, but I should advocate letting the calves have two or three meals direct from the cow, as it is nature's method, and the nearer we can start off in nature's footsteps the better. No difficulty will be experienced in teaching the calf to drink later, if one is careful to let it get quite hungry before attempting to feed it, and change gradually from whole to skim milk. After well started to drink it is advisable to give some grain in conjunction with the milk ration. Oil meal has been advocated, but it seems a waste to add such an expensive feed when another would do as well, or better, at less cost, as, for instance, corn meal or oat meal. This winter, at the Iowa Station, we are feeding whole corn, and it is pleasant to hear the little fellows two and three weeks old crushing the corn after drinking their milk or between meals. Care must be taken to have milk uniformly sweet. Alternate sour and sweet milk will kill any calf. To get the best results from skim milk it must be separated on the farm; and I believe the hand separator has come to stay, because it is profitable and because it is labor saving. A good way to run it is to use his majesty, the dairy bull.

This brings me to a brief discussion of some points to be considered in the care of this same animal. First, in selecting him be sure he is from a deep milking strain. Do not be satisfied because he is a bull, but use him because he is a good bull. Of course, somebody must start out with him, but if you can get him after you have seen his get and are satisfied with them, then you are the lucky man. Fooling with bulls is expensive, for half of each calf is from him, and one year is not enough, generally speaking, to decide on his merits. He should be kept in good, hard flesh, and be let run in a paddock. Never let him run with the cows, for he is liable at any moment to hurt some one. Ring him early in life, and keep the ring in good repair. In winter it is best to keep him along with the cows, as he will be quieter and more easily managed. If fall calving is adopted, as it should be and eventually will be, his services will be required in December and January, and he should be prepared by being put in good hard condition. Such should also be the condition of the heifers previous to and at date of calving.

The first calf of any cow should come before she is quite two years old. This first period of lactation is the most important in the career of the dairy cow, for upon her care and management during this period depend to a great extent what kind of a cow she will make. The first period should be long and everything should be done to develop her milking powers. A pound of grain fed during this period of lactation is worth two fed at any succeeding one. The first part of the period is the time to do the most work towards development.

The care of cows just before and after calving demands much judgment. The cow should be placed in a box stall and receive laxative feed for a few days previous to parturition, and it is frequently advisable to give a mild purgative, say one to two pounds of Epsom salts. After delivery the cow should be fed lightly and have her water warmed for a few days. It is not well to have the cow fat at this time but in a good strong condition.

The cow should have a rest between periods of lactation. It is sometimes difficult to stop the yield of milk, but if you keep on milking you will never be able to do it. To end the period just stop milking. That is all; of course, a few days previous to quitting, it is necessary to give less feed. A careful watch must be kept of the udder and if any

caking appears it must be relieved. I have tried this and have seen it tried most successfully in a number of stubborn cases. A good plan is to give a dose of Epsom salts as it checks milk secretion.

(1) Once safely past the critical time of parturition the great question of feeding for milk arises. There has been in the development of our various dairy breeds no more potent factor than feed. Cows imported to this country have in a few generations developed wonderfully in both the quality and quantity of milk yielded. This is doubtless due to the abundance of rich feed supplied our cattle here. It is known that the average fat in milk is about 1 per cent. greater now than it was but a few years ago in some of the European homes of our dairy breeds. It is in the feeding where the dairyman must show his liberality, and there is no place where liberality will secure a more generous return. About 60 per cent. of all the cow can eat is required for maintenance, and it is the other 40 per cent. of the food she is able to assimilate that brings a return. You can thus see what a penny-wise and pound-foolish policy limiting the feed of a dairy animal is, since every extra pound the animal can use is so much more from which a profit may be made. Make sure you are giving your animals all they can eat, and then begin to study individual capacities and divide your feed, giving most to the largest eaters.

(2) The amount of feed, however, is not any more important than the quality. To give a cow all she can eat of, say, ensilage and oat straw, will not insure a liberal yield of milk. The digestible dry matter being low in silage, it would be necessary to eat an immense quantity to get sufficient feed, and even then the relation between the nitrogenous, or milk forming, and the carbonaceous, or fat forming, parts would be such as to render the yield of a large amount of milk unlikely or impossible. To the roughage, therefore, we must add concentrates, generally speaking about 40 per cent. of the dry matter should be concentrates of grains.

The best roughage to use will depend a great deal upon what is most easily obtained and the cheapest. To insure health and a liberal yield of milk it is almost essential to use a succulent feed of some kind, silage, or roots, or both. Of dry roughage clover hay is the best for milking cows, as it contains a relatively high percentage of milk-forming matter or protein. In addition some chaff or straw may be fed.

Considering the concentrates to be fed, so many local conditions affect the choice of these that it is almost useless to attempt their discussion. I might discuss the properties of a few of the principal feeds available in a general way, paying special attention to their action upon the yield of milk.

(3) Oats, chopped, furnish an excellent feed rich in protein, while if peas are added the mixture is still better and richer in that essential. This forms a good concentrate to feed along with silage. Oil meal in small quantities is very useful with silage or roots, especially the former, as it is very rich in protein.

Bran constitutes one of our best and most valuable feeds; it is rich in milk-forming matter, and is a very healthful feed for cows.

Cotton seed meal, gluten meal, gluten feed, and various other by-products, are all excellent when fed with judgment, but prices of both milk and feed must decide whether it will pay to use them, as for instance with milk at 60 cents per cwt. and bran at $16 per ton it would pay well to use it.

Very often I am asked by farmers to give a good dairy ration compounded from the feeds under discussion, and I would suggest of these for a 1,000 pound cow 30 lbs. silage, 10 lbs. clover, 8 lbs. chopped peas and oats, 2 lbs. bran and 1 lb. oil meal. Leaving any one of the concentrates out would necessitate increasing the others, or the clover rather than the silage.

(4) There is another important factor to be considered besides the food value in purchasing food stuffs and that is their manurial value after they have served the milk producing end. A great many experiments have been conducted along the line of determining what rations give the best results. A short time ago Storrs Experiment Station

conducted a series of experiments among some of the best dairy herds in the eastern states, their aim being to determine the best ratio between the nitrogenous and the carbonaceous parts of the ration. In nearly every case it was found that adding nitrogenous matter to the ration increased the flow of mild sufficiently to make a profit on the increased expenditure. In Iowa we are at present conducting some feeding experiments with dairy cattle, and, though not completed, the same results are indicated. Another factor in milk production is, however, attracting much attention at that station, and that is the apparently wonderful effect of variety. Some of our cheapest rations are giving results almost equal to those richest in protein. The same fact is being demonstrated in Wisconsin, and is, I think, bound to receive more and more attention in future. Of course I do not mean by variety changing kind of feed each meal. Cows giving large quantities of milk require rations rich in protein. As the flow decreases the amount of protein may be decreased, and the whole dry matter too if it comes to that.

Palatability is a most important consideration in feeding dairy cattle, for of a palatable food a much larger amount will be consumed. Then let variety, palatability and protein be your watchwords.

(5) Many farmers turn their cattle on pasture in May and feed them nothing extra until they again enter the stables. If a drouth comes they think luck is against them, and are resigned to lose $10 or $15 per cow, while this loss might be easily avoided by protecting the cattle from the heat and feeding them some green fodder. Even should it not pay while feeding—which it will, however—the keeping the flow of milk *up*, *will*, in the end, much more than return any outlay; and I might say right here that the feeding of grain in summer, while not always profitable, is very often of benefit in keeping up the flow of milk not only that year but the next also. This is especially marked in young stock. At the experimental farm in Iowa the cattle are housed and fed during the hot fly period and a good profit made. I would strongly urge the protection of the animals from the extreme summer heat, even should no food be available; better protect them during the day and let them eat at night than expose such sensitive nervous animals as good milch cows to the heat and irritation of flies.

(6) Once the ration is settled the question arises, how shall it be fed? At the Ontario Agricultural College it is the practice to make a sort of hash, the great aim being succulence. This is an excellent method, but is not always the best, and involves a great deal of work. Many cattle when fed a mixture like this spend the time mouthing the food over, picking out the grain and sometimes even sorting that, and they never seem satisfied. A good way, and one which seems to please the cattle better than any other, is to give the concentrates first and then the roughage to eat at leisure. I have found this to work well, and many experiment stations are feeding in the same way. When labor is very cheap and feed dear it will pay to cut the hay, otherwise not. A little cut hay or chaff mixed with the chop or meal will prevent too rapid eating and thus aid digestion. As to the number of times to feed it is largely a matter of custom, but once the animals are accustomed to receiving certain feed at a certain hour it is bad to fee. any later or any other feed, as they become uneasy, and the effect is always too much in evidence when the milk pail comes around. Salt should also be given daily, about ¾ to 1 oz. per day being sufficient.

(7) Water should be given after roughage. It is best to water inside, as then each animal is likely to get all she needs and is not rushed. A large yield of milk needs a large supply of water. Warm water will increase the flow of milk but not enough to pay the expense of warming. A most successful dairyman and State Dairy Commissioner for Iowa, P. B. Norton, waters his cows by letting the water into the feed troughs; this is done a short time before feeding and when the majority of the cows are through drinking the water is shut off leaving a gallon or so of water in the trough. Into this the ensilage and grain are dumped. He claims excellent results from this system, and I know that he is one of the most progressive dairymen in the State. His is a system of rushing every animal for all she is worth, and that is the system that pays where dairy produce is the sole object. If pure bred stock are kept of course other considerations enter in with which I may not deal.

(8) Warmth is most essential to dairy cattle. Exposure is sure to effect the milk flow most injuriously. In Indiana an experiment was conducted recently where it was shown that the loss from one cow exposed to the weather forty-eight days was $4.26. But warmth must not be secured at the expense of a plentiful supply of good pure air. Good ventilation is most necessary, and if we are to stamp out tuberculosis from our dairy herds good ventilation will be the chief factor in its eradication. Take for instance our ranch cattle, tuberculosis affections are almost unknown, and to my thinking for no other reason than that they have all the good pure air they can breathe. To think of shutting up cattle in a stable with one or no outlet for foul air or inlet for fresh, save a stray cranny, is nothing short of folly and cruelty to animals, and can never be followed by anything but failure.

Where little attention is paid to ventilation there is usually as little paid to the offensive odors arising from the manure, and these injuriously affect the cow. The care of the manure is by no means the least important of the many problems which confront the dairy farmer. Many farmers seem to consider that a good part of it may be well preserved on the hams of their cows. This is one way of keeping it but it is a very expensive way. To avoid this the animals must be well bedded, for if good results are to be hoped for comfort and kindness are above all things necessary. A good plan is to have a covered manure yard into which the manure from the horse barn is also carted and the two mixed, as must straw being used as possible. Another purpose which this manure shed may serve is as a yard for the cattle. Exercise is essential if health is to be maintained and the greatest profit reaped, yet to turn cattle out in our cold winter weather is little short of throwing profit to the winds, and profits are what we are all after. Of course, it is possible to accustom cattle to a short period of exposure, so that they will not be very seriously affected by it, but the less the better. The plan I have suggested is one which I have seen tried in one or two cases, and, so far as I could discover, gave excellent results, while Prof. Roberts has conducted an experiment which shows conclusively that the plan is a good one.

Now much that I have said is not new to most of you, probably to none of you, but to some who are starting, or to others who may have got into a rut, I would particularly appeal to do what you can to improve your methods. Much may be done by the stations, but without the hearty co-operation of the farmer all is in vain. Every step forward any one of us can make is a gain for the glorious calling of ours—a calling which makes manly, intelligent and upright men, and the only calling which develops every side of man's nature.

To the manufacturing dairyman, I have, in conclusion, a few words to say. Upon the product of the dairy farm you are dependent for your prosperity, and the greater the amount of raw material you can have produced the greater your profit. For who ever knew a factory closing because there was too much milk?

Now you have a number of inspectors or instructors whose duty it is to go around and visit the factories and give individual instruction. Why not extend the system somewhat, and have a few instructors on the care and feeding of dairy cattle, who in any section where there is poor milk being supplied would be available to give individual assistance to the farmer, to give him such instructions as would enable him to produce a better quality and a greater quantity of milk from a given outlay?

That this is a practicable plan, I am certain, and by this means the very men who need the help most, men who do not attend our institutes, men who read little and think less, men who have got into a rut axle deep, would be reached, and who knows how many of them would be roused and made into progressive farmers, such as go to make up our noble country.

Another plan I would suggest, and which I am surprised has not been tried previously, although so far as I can find out it has not, is the issuing of a monthly or weekly slip, each issue to contain a few suggestions, hints on feeding, management, milking, care of milk, and kindred topics. Ours is a business; let us put business principles into it and push it. If a business man goes into manufacturing he does not wait until the govern-

ment rustles around and spurs up his supplies of raw material. but he steps in himself and takes a hand. Reach the man in the rut, the others will look after themselves, although constant watchfulness is necessary lest the best of us find himself in a similar fix.

Mr. D. ROGERS, M.P. : What do you think of exercise for cows? Do you approve of the method advocated by some in Germany?

Mr. GRISDALE : The summary of the experiments there are to the effect that the working of cattle will decrease the yield of fat in milk. The exercise in Germany is genuine work, such as hauling a plow.

The PRESIDENT : If the cow is making a lot of milk each day do you not think she is having lots of exercise? What do you think about a cow travelling around in the snow?

Mr. GRISDALE : Having the cows come out in the winter and take moderate exercise is, I believe, conducive of health, and unless your animals are in good condition of health you cannot expect a large flow of milk or a high range of butter fat, or anything else. Mr. John Gould, of Aurora, Ohio, advocates rest for the cow in winter. Well, a man needs exercise as well as rest, and so also does a cow. It does not do for a man to exercise violently in the summer and then lay up all winter and do nothing. And I am of opinion that a cow requires exercise to a reasonable degree in winter as well as any other animal.

Prof. DEAN : Do you think it is necessary to turn out cows every day in winter for exercise in order that they may be in a healthy condition, and so be able to give large quantities of milk?

Mr. GRISDALE : No ; not every day. There may be days when it would not be wise to turn them out. But frequent exercise, I believe, is essential to health.

The PRESIDENT : That is different to what we have been telling the people for some years. We have been urging them to build better stables, properly warmed and ventilated, to feed the cows well, and not to let them out for exercise in the winter. Now, let us get at the heart of this thing. If you agree with Mr Grisdale, that it is well to let your cows out in winter for exercise, say so ; and if you don't believe that say so, too. If I have a stable properly built and ventilated I would not turn an animal out from November to May. That is my personal view.

Mr. GRISDALE : Prof. Roberts, of the Cornell University, has been conducting experiments with this end in view, and he has found that giving them sufficient exercise for health has increased the yield of milk about eight per cent.

Mr. DARGAVEL : How does he exercise the cows?

Mr. GRISDALE : He built a small stable with just barely room to feed and milk them. After the cattle are fed they are allowed to go out in the yard, which is a large covered affair, and which contains a lot of litter and roughage. They are not rushed around by a dog, but are allowed to move around or lie down at their leisure. It has been found conducive to milk secretion. This place is well boarded and well lighted. The cows are put back into the small stables for night. The place for exercise is practically a large covered shed, with windows in it.

Mr. D. M. MACPHERSON : At Cornell, according to Mr. Grisdale, Prof. Roberts has a small stable for his cows, and that means a lack of ventilation, which would have a deteriorating effect upon the cattle kept therein. A cow should have plenty of pure dry air. I have had eight years' experence keeping from 70 to 80 cows and steers, and find that it is good for them to be tied in for six or seven months. They never come out from the 10th of November until the grass starts in the spring. My cattle do well under that treatment. They have a bright eye, sleek hair, and are never sick. I have a wooden floor in my stable.

Prof. DEAN : I think that perhaps a happy medium would give the best results. I am afraid that if you advocate "exercise" it might be carried to an extreme by many. The average farmer seem to think that exercise is turning out cattle for the whole day. Surely that kind of exercise can have no advantage on the health of a cow. I think that

on a mild, sunshiny day during the winter the cows might be left out with advantage. I understood Mr. Grisdale to advocate feeding long hay—that he is not in favor of cutting the hay. We fed silage alone at first, but now we feed silage and cut hay together in the Dairy Department of the College, and I find that the flavor of the milk is improved considerable by mixing the hay with the silage. If you feed silage alone you must feed it carefully if you do not wish the flavor of the milk to be impaired. We get the best general results by mixing cut hay or cut stray with the silage. Let the cows eat the meal first, and then take the mixed silage and cut hay or cut straw if they like it.

Mr. Grisdale: How do you account for the silage affecting the milk when fed alone, and not doing so when mixed with hay?

Prof. Dean: I think it must be that the hay absorbs the silage odor or flavor. The silage odor may come from the cow breathing the silage odor in feeding, and the hay might prevent that.

Mr. Grisdale: I believe that the cutting of the hay will improve it somewhat, but I do not think there is sufficient profit to be derived from the cutting, especially if labor be expensive.

Mr. D. Rogers, M.P.: Will exercising the cow by letting her out into the open air have any effect upon the progeny?

Mr. Grisdale: I think the effect would be to make the progeny stronger. I would not let the animals be exposed to bad weather, but would let them take a little exercise or outing every fine day.

Prof. Hart: The question of watering stock in the stable is an important one. If the water is chilled when the cow drinks it we will not get as much milk from her as if the chill was off the water. If the cattle take this ice-cold water they will be chilled, and will not respond as fully in giving milk, for the cow has to give some of her energy in warming up the water she has taken. It does not pay to use good food to warm water. I visited a stable the other day and saw where the water was put in a large covered tank, and kept at about ten or twelve degrees higher temperature than that of the other water brought directly in. This meant a good deal to the cows. They were not so likely to get chilled, and the plan is a cheap and practical one. The tank being covered the water was not affected by stable odors.

MUSIC AND FLOWERS.

The evening session was largely attended, and was enlivened by several well rendered selections by an orchestra.

Mayor Ryan presided, and again extended a cordial greeting to the members of the Association. He said he took a peculiar interest in the gathering, having been a farmer's son, and having done a little in the dairy line himself. He remembered the first cheese factory in the county, that started by Mr. D. G. Wagner. In fact the speaker had the distinguished honor of being the first boy to unload the milk from the waggons. (Laughter and applause.) He was pleased to know that professional men were turning their scientific knowledge to account in helping along the dairy industry. So long as improvement in manufacture was kept up so long would the business progress. First-class work had always to be done in a cheese factory, as the English market would not stand any humbugging. He rejoiced to know that Eastern Ontario was producing some of the best cheese in the world.

Dr. James Fletcher, of the Central Experimental Farm, Ottawa, then gave an interesting address upon "House Plants." He described the habits of several favorite window plants, and gave valuable hints regarding their cultivation.

THE AGRICULTURAL RESOURCES OF CANADA.

By Jas. W. Robertson, Commissioner of Agriculture.

Canada is essentially an agricultural country. Forty-five per cent. of its population are engaged in farming. Agriculture has grown to mean more than the cultivation of fields. In its primitive state the practice was to scratch the bosom of Mother Earth, sow seeds, reap and eat the crop. Muscular strength was the chief mainstay of those who followed it, and rigorous self-denial their almost only economy. Now the varied operations of mixed and special farming require knowledge and training in many different directions. The basis of prosperity and the means for attaining and maintaining it, are not so much rich soil as intelligence, industry, skill, frugality, fairness, tenacity and untiring energy on the part of the people.

The Creator has stored Canada full of good things, and of all the good things with which this land is blessed, from the fertile soil to the flowers of humanity, I do not know of anything that cannot be made still better by intelligent labor, justice and patience.

The more I learn of the character, extent and availability of the agricultural resources of Canada, the greater is my confidence that material prosperity will abound in this favored land.

Wealth from the Farm.—It is admitted by everybody that the sure way to increase the country's wealth is to realize upon its natural resources by the application of intelligent labor. Wealth may be defined as whatever administers to the happiness of mankind and the ownership and possession of which can be transferred from one to another. In considering the value of the products of the four great first or natural sources of wealth in Canada, one learns that the annual value of the products of the mines is about $30,000,000; of the fisheries, $20,000,000; and of the forests, including firewood, about $80,000,000; but the annual value of the products of the farms of Canada has been about $600,000,000, that is to say, for every dollar of wealth realized from the other three natural resources, four and a half dollars have been realized from agriculture. The total value of all the gold produced in the world has been estimated at about $200,000,000 per annum. During the last three years the total value of silver produced in the world has been on an average $210,000,000 per annum. As against these amounts one may put $600,000,000 as the value of the crops and products of Canadian farms every year.

The Resources.—The resources of any country may be roughly classified as :—

(1) Inexhaustible resources. (Instances of such are soil, climate and water supply. In this sense the soil itself is quite different from the fertility of soil).

(2) Resources which are exhaustible and not restorable. (Instances of these are coal fields, gold fields, oil wells and natural gas).

(3) Resources which are exhaustible and restorable but which are liable to deterioration. (Instances of these are fertility of soil, the supply of fish in streams, lakes and seas, and water powers.)

(4) Resources which are exhaustible and restorable and capable of improvement and increase by good management. (Instances of these are fertility of soil, building materials, available labor and managing ability.)

Agricultural resources may be stated as those to which the tiller of the soil goes back for materials and energies out of which farm products are formed. They may therefore be defined as substances, forces and conditions which may be used to bring into existence such forms of animal and plant life as may be useful to man.

The production of food is the ultimate object of every effort in agriculture. Nobody can create anything In fact the production of food and the whole range of agricultural operations are but the conversion of one natural force from one form into another.

The sources of nutrients, or nourishing ingredients in food, are depicted in the following :—

Sun, Air, Water, Soil,	Plant Food,	Drainage, Cultivation,	Animals, Plants, Seeds,	Food, Service,	Man.

The soil, water and air are the original sources of the elements which constitute plants and animals, and therefore of all products derived from them.

Quantities of Nutrients per Acre. The following chart, showing the quantity of nutrients per acre, indicates also the possibility of maintaining at least one person per acre so far as the supply of food is concerned.

	Albuminoids.	Carbohydrates.	Fats.
	Lbs.	Lbs.	Lbs.
Indian corn (9,000 pounds dry matter)	873	7,371	288
Horse beans (twelve tons, green)	653	1,814	167
Sunflower heads (seven and one-half tons)	352	2,373	729
Hay (mixed, two tons)	271	2,888	97
Roots (carrots and mangels, twenty tons)	480	4,320	68

One object sought to be gained by the feeding of cattle is the elaboration of these crude nutrients into finer forms of food fit for human use. An intelligent man keeps milch cows and feeds them on cornstalks. He is able to drink cream. The soil, the plants and the animals are all instruments of conversion ; and the objective is an abundance of food and service for mankind.

After providing food for the domestic animals required to elaborate coarse fodders into finer forms, the crops from five acres under a high class of cultivation might sustain five persons in abundance of good food.

About 30,000,000 acres of land in Canada are now occupied for cultivation. There are certainly 300,000,000 acres more quite as fertile and capable of carrying crops of cereals If and when these are cultivated to their possible limit of production, the food for three hundred millions of people may be obtained from them.

Suitable Education Required The occupation of agriculture has changed very much and is still changing. It has always been three-fold in its character, being partly a trade, partly a business and partly a profession. To enable him to understand its underlying principles and to carry on his work with the greatest measure of profit and pleasure to himself the farmer requires wide exact knowledge and a thorough training or education.

The education of the boys and girls who are afterwards to follow this calling should be of such a character as to fit them to engage in it with the best chances of success. The progress of humanity from its most primitive and crude states has been measured by the abilities of individuals to use a crude weapon, then a simple tool, then a more complex machine, and finally a more delicate and complicated instrument. Successful agriculture demands that the people who follow it be a capable, educated people, trained in such a way as to have ability and facility in making the best use of themselves and of tools, machines and instruments.

Manual Training and Nature Studies. Manual training early in life is necessary for the development of mental power that may be used in the best way for the good of the individual and his fellows. The best training in early life is through the hands. For the safety and prosperity of the State, it is much more important that boys and girls should be educated, that is trained, to use themselves well for earning a living and employing their leisure time, than that they should be drilled and helped to remember dates and names and rules and theories. It would be a great benefit to boys and girls if much more time in school-rooms could be given to spoken lessons and object lessons

dealing with realities and substances and less time to theories and symbols. It is not half so important, or useful, or delightful, to men or women to be able to explain the universe as to do a man's or a woman's work in it day by day.

An understanding of the why of things may very well come after one has a knowledge of how to do things, especially of how to bring things to pass which are essential to the maintenance of life and comfort. Education in rural school-houses should certainly be such as to call into exercise the highest qualities of intelligence and industry, and these as they may be employed in the every-day lives of the boys and girls when they grow up. All that would lead to good management, and further to the delight and glory of having an intelligent purpose in productive labour. That is very much better than the gloom and spirit-poverty of a dull round of drudgery, even in the writing of books or the propounding of philosophies.

In every sense the availability of the resources of Canada depends more upon the intelligence and character of her people than upon anything else. As these are largely the product of education, it should be directly of such a nature as to call into exercise the highest qualities of mind and body in their daily lives. A people who have a genius for doing commonplace things well are bound to succeed. The development of that genius is education.

Cultivation. Cultivation has much to do with the physicial condition of the soil. That, with the climate, controls in a very large measure its fertility. The productiveness of soil depends much more on the quantity of the materials which are available (from being soluble or easily soluble) than upon the total quantities of the elements or constituents of plant food which are present in it. The power of a particular crop to assimilate the substances which become its food, is also an important factor. Part of that power is the ability of the crop to render portions of the soil soluble by the slightly acid juice of its rootlets. Drainage and cultivation are means for preparing materials in the soil which the growing plant may take as its food from that source. Cultivation for killing weeds is another name for destroying the thieves in the vegetable kingdom, who steal the food and usurp the place of useful plants.

The Four Most Important Elements. Nitrates are the constituents of soil most valuable for enabling it to yield large crops. The analyses of some soils in Canada show that they contain about thirty thousand pounds of nitrogen in one foot in depth per acre. Ordinarily, fertile soil contains from three thousand five hundred to ten thousand pounds of nitrogen in one foot in depth per acre. The average of some analyses of Canadian soils by Mr. Shutt, Chemist, of the Dominion Experimental Farms, shows that they contain the following percentages :—

Of nitrogen	.25	of one	per cent.
Of phosphoric acid	.18	"	"
Of potash	.39	"	"
Of lime	.66	"	"

That would show such soils to contain on an average, in one foot in depth, about the following quantities of these four constituents of plant food per acre :—

Of nitrogen	7,700 lbs.
Of phosphoric acid	5,400 "
Of potash	11,700 "
Of lime	19,800 "

If these were wholly assimilable and all available by the plants, such soil would contain enough nitrogen for about 150 average crops of cereals, enough phosphoric acid for about 250 crops and enough potash for 750 crops. But when the percentage of these gets below a given point in soil, it becomes practically barren.

Proper cultivation of the soil has much to do with the quantities of these elements of plant food which are assimilable at any one time; and also with the amounts which may be made so from year to year.

Nitrification through Bacteria and also through Fodder Plants. The nitrification of the soil, through the action of microbes in the soil, goes on at a considerable rate, particularly through the growing of such plants as clover, beans and peas. The microbes have the power to work on the roots of these plants and collect free nitrogen from the atmosphere. The nitrogen, by the action of the microbes, is converted into an available form for the plants, on the roots of which these microbes live. They become veritable accumulators of nitrates in readily available form for the maintenance of plants in succeeding crops. They are mighty gleaners.

A striking instance of the result of their work was shown when Soja beans, sown from seed imported from Japan were grown in the State of Massachussetts. The crop was a splendid one. A crop of similar sort, grown in the neighbouring State of Connecticut was reported as being a complete failure. A close examination of the plants from the two crops showed that the plants of the good crop in Massachussetts had roots that were covered with small nodules, something like warty excrescences The roots of the poor crop in Connecticut were comparatively smooth and free from these nodules. A careful microscopical examination showed that the nodules were evidently the result of bacteria at work on the roots of those plants which carried them. Through these nodules the plants had evidently been able to take in free nitrogen from the atmosphere. Soil enough was taken from that field to fill a few sacks. It was pulverized, sown on a field in Connecticut, and in the following year the Soja beans were reported as yielding an abundant crop. The soil had been inoculated with the bacteria from the original field in Massachussetts. Doubtless at first bacteria came in the form of dust with the seed from Japan.

Rotation of Crops Should Include the Legumes. The Soja bean has been grown on the Experimental Farm at Ottawa with a fair measure of success. Last year it yielded nine tons 520 pounds green fodder per acre, grown in rows thirty-five inches apart, and twelve tons 1,800 pounds per acre grown in rows seven inches apart. It has a high percentage of nourishing substances, and is thus a valuable fodder plant wherever it can be grown.

Clover is another of the crops which evidently has the power of collecting free nitrogen from the atmosphere through its roots The roots of the clover plant, left in the soil, have a very high fertilizing value. That is not only through the material which they collect from the atmosphere and leave as manure for succeeding crops, but they open up the soil and cause it to be more porous. That makes it more productive.

In a trial test when Indian corn for fodder was grown on land where a clover sod had been plowed under, the yield has been from $2\frac{1}{2}$ tons to $4\frac{3}{4}$ tons more per acre than on a similar soil on which no clover had been sowed.

The availability of these resources depends somewhat on a suitable rotation of crops. The action of one crop upon the soil seems to prepare it and the plant food which it contains, so as to give some succeeding crop the best chance to yield largely.

Let all Manure be Saved and Applied. As a rule it is not a good plan to sell the bulky, primitive and crude products of agriculture, particularly those in the form of hay, straw, roots and coarse cereals. One ton of hay takes from the land as much of the substances of fertility as 37 tons of butter; and the sale of one ton of wheat removes from the farm more elements of fertility than the disposal of 100 tons of butter. The first essential in all profitable agriculture is to obtain large crops of good quality at as little expense as possible. The feeding of the crops or part of them to live stock is the second essential to successful farming in Canada. The third essential is the maintaining of the fertility of the soil without paying out a large share of the income for commercial fertilizers, particularly when the most valuable part of these can be obtained from the growing of leguminous crops, such as clovers, peas and beans.

The use of enough bedding or litter of some sort to absorb the liquid manure, provides for adding the vegetable matter of rotting straw or some other substance to the land mixed with the droppings of animals. These become humus which enables the

soil to retain moisture in dry weather and also makes portions of the soil more readily soluble and thus available for plants.

Grading up Seed Grain. The selection of the particular variety of each kind of seed to be sown is a matter of great consequence to the farmer. One variety of oats may yield from ten to twenty bushels, or even a greater quantity than that, more per acre than another variety. If every farmer would select from the growing grain enough heads from the largest, most vigorous and earliest ripening plants in the crop to make one bushel of seed, he would have the beginning of a very great improvement and increase in the crop of that kind which he could grow. Such selected bushel of grain might be grown on a particularly well prepared plot; and might thus become the seed grain plot on the farm for that kind of grain. A selection from the largest, most vigorous and early-ripening plants should be made each year of every kind of grain. In the course of a few years the crop obtained in that way would be such as to augment the revenue of the farm from the same fields, probably from 25 to 30 per cent.. Vigour of life in the plant as well as in the animal is indicated by power to overcome obstacles, power to take possession and power to hold. In the case of plants they take from the soil and atmosphere, and hold in organized forms for the farmer.

The Commerce of Agriculture. The commerce of agriculture is closely connected with the agricultural resources of the country. Markets never mother the farmer. They give him as little as thy can help for the products with which he supplies them. In the competitions between different sorts of products for the first place in markets those are preferred which are most nutritious and most pleasant to the taste and to the eye. That shows that farmers will obtain more in exchange for what they have produced when those things are of the best quality and in the nicest condition rather than when they are merely of ordinary quality without any special excellence.

Improvements in transportation facilities enable farmers to realize upon agricultural resources with more advantage and success. The cost of carriage in most cases ultimately reduces the value to the original producer by its own amount. Means of transportation are necessary to the carrying on of farming; and the carrying should be done cheap in order that good times may continue among the farmers.

The application of cold storage is helping the farmer to realize upon the agricultural resources of the country. That has made it possible for fine and highly perishable food products to be sent from Canada and delivered in Great Britain in the pink of fine condition. There were carried in cold storage on the steamships from the port of Montreal last year, 209,172 packages of butter; 7,668 packages of meats and 25,564 packages of fruit. The British market is evidently the one to which the surplus of Canadian farm products will go. The importations of such staples of food products as Canada can well supply is not less than six hundred million dollars annually.

The export commerce of the country is increasing at a very rapid rate. The following comparative statement of the value of the exports of some of the farm products of Canada during the years 1896 and 1898, shows the growth in that short period, and indicates something of the great capacity for extension.

Value of some Canadian Farm Products Exported in Years 1896 and 1898 (Years ending June 30th).

	1896.	1898.	Percentage of increase.
Cattle	$7,082,542	$8,723,292	23
Pork, bacon and hams	4,446,884	8,092,930	82
Butter	1,052,089	2,046,686	94
Cheese	13,956,571	17,572,763	25
Poultry and Game	18,992	100,736	430
Eggs	807,086	1,255,304	55
Wheat	5,771,521	17,313,916	200
Flour	718,433	5,425,760	655
Oats	273,861	3,041,578	1010
Oatmeal	364,655	551,757	52
Peas	1,299,491	1,813,792	39

Taking the total value of the exports from Canada of agricultural products and animals and their products, I find that in 1896 (in round figures) the United States took six millions of dollars worth, whereas the United Kingdom took forty millions of dollars worth. In 1897 the United States took seven millions of dollars worth, whereas the United Kingdom took forty-six millions of dollars worth. In 1898 the United States took five millions of dollars worth, whereas the United Kingdom took sixty-six millions of dollars worth. In 1898 for every one dollar's worth of agricultural products and animals and their products exported to the United States, thirteen dollars and ten cents' worth were exported to Great Britain.

Effects of Good Food. As the farmers provide the best quality of food for the people the race will increase in masterfulness, not the least characteristics of which will be masterfulness over one's self. He that ruleth his own spirit is greater than he which taketh a city. In a larger measure than is often perceived, the kind of people a nation is composed of depends on the character of the staple foods which they consume. The Anglo-Saxon race for centuries has been bred and reared on wheat, oats, and cattle and sheep products mainly. During the last few decades the increase in the consumption of swine products has been very great, and now the tendency is towards a much greater consumption of poultry products. We are essentially a race that has been reared on wheat, oats and cow products. It would be at terrible degradation to become a fried-potatoes and fried-pork people.

The Best Fruits of Agriculture. The occupation of farming should produce the best kind of people. It affords agreeable physical exercise, and is carried on amid pure air and sunshine. It should develop a people enjoying a large share of happiness and possessing intellectual powers of a high order. Its present drawback is that it leaves little leisure to those who follow it. However it gives security of opportunity to earn a living, and the want of that is what brings most of the worry and unhappiness into ordinary lives in these days of stern and keen competition.

The agricultural resources of Canada can be realized on with more advantage to the individual farmer when he co-operates with his neighbors, and, as far as practicable, does his part in the neighborhood organization for the production of things at the least possible expense. The co-operative principle as applied to cheese factories and creameries will doubtless be extended into other fields of agricultural effort.

Out of the best use of their talents in making the most out of the agricultural resources of Canada, will grow not merely healthy, vigorous and intellectual people, but communities with the highest qualities of unselfishness. The life of the farmer on the whole is an unselfish one. His calling instils in him a disregard of personal ease, a deep respect for the sanctity of other personalities, and at least some knowledge of the virtue of well proportioned foods in developing and sustaining the best forms of plant life and animal life. As the principles which underlie these attitudes and feelings are acted upon in his relationships to all human life, he will with a clear strong mind, and a heart continuously full of appreciative good will, reap satisfying harvests of all sorts out of the agricultural resources of Canada.

KINGSTON DAIRY SCHOOL.

On Wednesday morning the members of the Convention, upon invitation, visited the Kingston Dairy School, and a thorough inspection was made of the premises, the machinery and the processes of manufacture. The visitors were pleased with the completeness of the outfit and the excellent manner in which the milk and cream were handled.

WEEDS.

By Dr. James Fletcher, Entomologist and Botanist to the Dominion Experimental Farms, Ottawa.

The history of plant life is a most interesting and useful study, and I am pleased to notice that Governments are now seeing the importance of fuller information being imparted to the young regarding the development of plants and insects. In Manitoba schools regular instruction is now given in the rural districts upon the common wild plants and weeds of the Province. The same will soon be done in Ontario; most of our colleges have professors of botany, and studies in plant life form an important part of the Normal School training for teachers. In this connection, let me a say a few words about a recent publication entitled "*Agriculture*," written by Prof. C. C. James, Deputy Minister of Agriculture, Toronto. This work, I believe, cannot be too highly spoken of, It is small in size, elementary in character, and contains a vast amount of simple, clearly stated facts; it is sold, neatly bound in cloth and well illustrated, for twenty-five cents—a sum which puts it within the reach of everyone. If every farmer of this Province would read that little book and apply to his own work the useful information contained, Ontario would go forward with a bound. There are only 200 pages in the work, but I may tell you that if you read it you will probably do a lot more reading of other good and useful books; for you will be stirred up to seek further knowledge on the deeper branches of agriculture, to which reference is there made.

Science and practice must go together in successful farming. Canada owes more to scientific men for the advance of agriculture than most people think. Fifteen or twenty years ago Macoun, the botanist, was called a fool and a deluded enthusiast because he said that we should be able to grow wheat in Manitoba; but he knew that he was right in what he said, because he saw the same plants growing wild in the West on the prairies as he had observed in the best wheat-growing districts of Ontario, and he argued that if those weeds would grow on the prairies so would wheat also. To-day we know that Macoun was right, for we here cannot compete with the Northwestern provinces in the raising of first-class wheat.

Scientific students have advocated spraying for insect pests and fungous enemies on fruit trees, and while ten years ago there was hardly a spraying pump to be found in our orchards, to-day there are many thousands, and our fruits are being saved in better condition than ever before. Fruit growers are to-day in possession of information founded on simple general principles that enable us to successfully cope with ninety per cent. of the insects and diseases that assail our crops. During the past season I received in my own division nearly three thousand letters from farmers in Canada regarding weeds and insects injurious to agriculture. There are few subjects more interesting or so useful to study as the weeds of the farm. We should all like to say that we have not many weeds on Ontario farms to-day, but in our inner consciousness we all know that there are a great many too many weeds growing in every section of the Province. It is to-day a hard fight everywhere to keep the farm clean of these enemies. However, we all know that in every neighborhood there are some farmers who keep their farms cleaner than those of their neighbors; and further we know that this satisfactory state of affairs is because they understand more about weeds and how to cope with them than their neighbors do. This is a subject which requires to be taken up earnestly and studied as a specialty.

The study of weeds is an extensive one, yet it is a comparatively easy one, too, because all useful facts relating to it can be brought down to a few simple principles and classified. A little clear and thoughtful study of the question will soon fit a farmer to fight successfully with all kinds of these plant enemies. The first thing we must recognize about weeds is that they are enemies. They are present in our crops to fight against us and injure us year by year, and we must fight them and overcome if we would make the soil fit to give us the results we should expect. But in order to fight these weeds we must study them individually and know their habits, their weaknesses and their

strength; we must first find out the nature of each kind. Weeds take possession of our land and rob it of its fertility. They crowd out planted crops and hinder their development. If we allow another plant to exist just a little more vigorous and better able to take care of itself, the crop proper must be weakened if not altogether overcome. If the wild, unsown or unplanted crop is of a stronger habit than the one put in by the farmer, it will crowd out the latter crop to its great injury. Weeds sometimes become our masters; then we have to change the rotation of our crops against our will, because the land has Mustard or Thistles in it, and so some special crop which we may or may not want to grow must be planted to meet the circumstances. If Thistles get into our land, we must treat this latter so as to destroy the thistles; if Ox-eye Daisy is there, we must also give it special treatment with a view to destroying this enemy. Not only do weeds injure the yield and quality of both the crop grown and the soil, but the seed grain is also reduced in value by having mixed with it the seeds of weeds. Another danger from weeds is that the immediate injury is not always so great or conspicuous that it can be readily appreciated and brought home to the senses of the average man. But if you sit down and consider the matter you will see that the strength of richness of the soil is robbed by them, that the crops grown are also robbed by them and injured in quality as well as quantity, and, in the third place, that the seed reaped becomes so mixed and impure that future crops are threatened. So, after all, the loss is really enormous, and the matter deserves our close and earnest attention. Here let me give you warning to be remembered, which is that in no way are weeds so frequently introduced to farms as by buying cheap seed. For the sake of a couple of cents on a pound of clover seed some farmers have given themselves great trouble, costing directly and indirectly hundreds of dollars in time and after labor in the cleaning of their land. I have in my mind at present a certain district which has been almost ruined by the introduction of dirty seed purchased merely because it was a little cheaper than first-class seed. Many farmers also bring back bad seeds from town stables through feeding their horses with the fodder provided by the keepers of the stables. These seeds are often to be found in the manure dropped by the horses of the farm, and thus get into the land. There are now many good farmers who will run the risk of taking back weed seeds in the dung of their horses, so they take their own horse feed when they drive to town.

During the past year all through Ontario there has been a large quantity of weed called Clover Dodder springing up. This weed has been brought in with imported clover seed from Europe. Now, I am sure we can grow as good clover seed in Canada as they can in Europe or anywhere else in the world. (Applause.) How do I know this? Why, because we export some of the best clover seed to be found, and there is always a demand for Canadian clover seed. Let us keep this good, clean Canadian clover seed for ourselves. If it is good enough for outside countries, it is not too good for Canada. I do not think the Clover Dodder need ever become a bad weed; but it is a bad weed if not attended to. It is a true parasite. After the seed of this weed germinates in the soil, the young plant sends up a slender thread-like stem which lives as a parasite on the clover plants, twining round their stems and attaching itself to them by suckers through which it draws away their vitality. It forms large patches, sometimes six or eight feet in diameter. But unless the seeds ripen that attack or infestation dies out. The Dodder plant belongs to the Bindweed family, and is an annual, coming from seed every year. Along the fleshy stems at the proper season clusters of small white flowers are produced, followed in due time by small pods containing spongy brown seeds. These are produced late in the season, and sometimes do not ripen. In cutting clover, therefore, see that you mow it before the Dodder seeds are ripe, and by doing this you will avoid loss from this pest. With a little intelligent care on the part of farmers it is possible to eradicate this weed; but if neglected or allowed to spread it will do a great deal of harm; it chokes out the clover and is itself useless. In buying clover seed, always examine it carefully to see if there are any bad seeds in it. Do this also in the case of all other crop seeds you purchase. There is no man in such a hurry that he cannot afford to find time to examine the seed before he buys it. Get a small quantity of seed by mail from a reliable seedman, and if you feel that you cannot give it a proper examination yourself send it to Ottawa or Guelph, and we will examine it for you without any charge for so doing.

There are weeds and weeds—weeds and bad weeds. There are some weedy plants which after all are not the cause of so great injury to the farmer as might be feared from their appearance. They can be fought without much effort and easily overcome. But there are other weeds that we call by a big name—noxious weeds—and the difficulty and methods of fighting these vary with the locality and soil. For this reason, it is impossible to name any one weed that may be described as the *worst* in Canada. A weed regarded as a terrible pest in one Province may not be dangerous in another. There are, therefore, many "worst" weeds, varying according to the section or in the opinion of the farmer who has to fight them. Even the wild Prairie Rose is one of the "worst weeds" in Manitoba. Farmers have to break their land and disc harrow it for two or three years in order to get the long wiry roots out of the land. Coming back to Ontario, it may be said that the farmer regards as the "worst" weed that kind which gives him the greatest amount of trouble on his own farm. Some find Canada Thistle to be the worst, whilst others in the same township laugh at the idea, and say that the thistle gives them no trouble or very little. My father once refused to take some land because there were thistles on it, and a Scotchman came along and said to him: "Why, I would take the land just because there are thistles on it, for where thistles grow good crops can be made to grow." Some men think that Quack-grass is worse than thistles, while there are some who snap their fingers at Quack-grass. Some even declare that you cannot ever rid land of Quack grass if the pest once takes possession. This, however, is only because they don't understand its nature.

The PRESIDENT: It has been said that you may grub it up, dry it and burn it, and that the ashes will then make seed. (Laughter.)

Dr. FLETCHER (laughing): Yes, but they are mistaken. Quack-grass or Scutch-grass or Devil's Gut, as it is sometimes called—it has all these beautiful names—can certainly be overcome. We found a lot of this weed on the Farm at Ottawa, and it gave us some trouble, but our foreman soon makes short work of it now with shallow plowing. For every plant of this weed there is in Ontario they have a thousand in Manitoba, and yet there it is not considered nearly as bad a weed as in Ontario. The Ontario farmer who tackles Quack-grass says: "I will get it out if I have to plow down six feet." And so he plows as deep as possible, turns it up and under again and in this way gives the weed just what it needs to make it thrive, *i. e.*, pruning and replanting, and it revives and prospers with the treatment. The Manitoba farmer plows only three or four inches deep, exposing the roots to the sun and air, and not covering them with a few inches of soil so as to give them a fresh start in a mellow bed. My advice is:—Plow shallow for Quack grass. By doing this we have, at any rate, eradicated the weed on clay soil at Ottawa Mr. Derbyshire has jocosely said that if you burn this pest the ashes will grow. That is a good way to emphasize the fact that it is hard to overcome; but you only need to plow shallow and expose the roots to the air and sun. One man once told me that he had dried the roots by hanging them on the fence in the sun for several days and that they grew again; but I cannot believe this, as the roots and underground stems are succulent and dry up easily.

Mr. E. KIDD: I have been trying shallow plowing for years, and find it very satisfactory in getting rid of this class of weeds. I got an extra hundred acres a few years ago that were very bad with Quack-grass and it is now good and clean.

Dr. FLETCHER: In fighting weeds, we need to remember that there are three classes, (1) one-year plants, (2) two-year plants, (3) plants that live for many years. Of the last named some are deep rooted and others shallow rooted. Plants feed through their leaves and through their roots. By classifying weeds according to their habits—whether annuals, biennials, or perennials, and whether deep or shallow rooted—we have grasped the cardinal principles upon which to fight the enemy.

Wild Mustard is a one-year or annual weed that some persons declare they cannot get rid of. Every annual plant without any exception, in the first instance, grows from the seed, and when that seed has once germinated, unless the plant can ripen fresh seeds, it must die out. No Mustard plants can come from the soil unless there are seeds there, and, therefore, if you kill the young seedling, the plant, however abundant in land,

eventually must disappear. For all annual plants there is only one thing to do, and that is to germinate the seed, but do not allow the plants to ripen fresh seeds. Cut down the plants before the seeds can mature. Then it is well to remember that most seeds lose their vitality after a year or two. Seedsmen know this, and that is why they will let you have old seed at almost any price. Now, weeds are no exception to this rule. If they are imperfectly formed, or subjected to unusual heat, moisture or light, weed seeds will die like any other seeds. But, if buried deep in the soil, seeds, more especially those of weeds, will sometimes live for years. Deep plowing often has the effect of turning up bad seeds buried years before. A man gets a bad, run-down farm, and he says: "By hard work and good management I will get it clean"; and so he goes right at it and turns up the soil all over as deep as he can. The neighbours look admiringly on and say: "All right, old fellow; keep that up, and you will succeed." Well, if he keeps at it wisely for three or four years he will succeed; but if he lets his efforts slacken after a couple of years only the farm will be worse than ever, and he will very likely give up in despair. The first year's plowing has turned up a lot of these bad seeds buried years before, and he may get discouraged the second year. He must fight hard for three or four years. I am glad to say that our Canadian farms are not as bad in this respect as many claim, although there are more weeds on our old lands than there used to be.

They have learnt in the North-west to get rid of many weeds by fighting them according to the nature of the various kinds, and when possible by summer-fallowing before the plants produce their ripened seeds. Weeds must be fought when young. Do not trust to plowing your weeds down, to add to the fertility of the soil. That plan is not a wise one, and the advocacy of it I consider rubbish. The game is not worth the candle. The amount of added fertility is not sufficient to compensate for the danger of plowing in ripe seeds. Clean your land of weeds early, and put in some other fertilizer. By doing this you cultivate the land and kill the weeds at the same time. In some parts of Manitoba, because of the neglect of this plan they have found the land become so dirty that they have sometimes had to plow under a good many acres of wheat. Try to kill the weeds as early as possible in the season.

Stink-weed or Penny-cress is a weed that has given much trouble to the farmers of Manitoba It is a robust plant and is perfectly able to take care of itself. The farmers find that it pays to plow under that weed when young, and save their land for the future. The new implements called "weeders" can be used to great advantage in growing crops of grain to clean out the weeds while young, and there is no difficulty in keeping the land clean for the rest of the year as the crop will keep the weeds down. Near Emerson they found that the Stink-weed increased and took such possession of the land that it made the whole country, in spring, look like green velvet. But in the midst of the abundant occurence of this weed some men by the simple use of weeders and light harrows are cleaning their land thoroughly and reaping as a reward magnificent crops. They can harrow the land or run a weeder over it when the grain is three or four inches high with little or no danger to the crops. Some people are too much afraid of up-rooting their grain. In England some years ago fox hunters ran across a farmer's field and the horses' hoofs tore up a field of winter wheat. The farmer figured on his bill for damages—for the fields sometimes look terribly bad after a run—but later he tore up his bill and said: "Why, my crop is bigger than ever, because the soil was stirred up." (Laughter and applause.) You know how much you can harrow a corn field and with how great an advantage, when the plants are several inches high. I do not think a man ever injured his corn crop by over-harrowing You can harrow your wheat with profit, too. The weeder I have referred to is like a hay rake; it has three sets of teeth; these teeth slope out so as not to tear up the plants and are flexible, and as they go over a field do no injury to the roots of the grain crop. They do good in two ways, first by destroying the weeds, and second by cultivating or stirring the surface of the soil and thus holding the moisture there for the growing crop.

Last year we had a crop of young peas growing at Ottawa that we were very anxious to save, as we had been experimenting with the variety for several years. I went out to look at them early in the season, and found a man working on them with a weeder. He

had done a row and a half before he was stopped. However, that row and a half gave a better return than any other portion of the field of the same size. The plants got the advantage of the young weeds being killed, and made more rapid advance on account of the surface being stirred. The hotter the weather the more you should cultivate. Cultivation—the stirring of the surface of soil—preserves the moisture, and thus adds to the growth of the crop.

The Bull Thistle is among one of the two-year plants that come under the heading of a bad weed. The seedlings begin to grow one year, but the plant does not produce flowers and seed until the second year, after which it dies. Delay is dangerous in this case, and the plant should not be left until the second year. Kill it before it gets too big. Otherwise you will have a lot of deep roots that will have to be got out with a spud.

I may now briefly discuss perennial weeds. There is one important secret about perennial plants, and that is to find out whether they root near the surface or go down deep into the soil. As I have already said, plants feed through their leaves and through their roots. It is common to speak of the leaves of plants as their "lungs," but I think it is more correct to describe the leaves as the "stomachs" of plants, for the leaves take in from the air carbonic acid gas, and, mixing it with water taken up by the roots, they elaborate all the materials necessary to build up the tissues of the whole plant. If you take away the leaves, the plant dies; therefore, this must be borne in mind when fighting against deep-rooted perennials. Shallow-rooting plants can be easily disposed of by simply plowing them up so as to expose the roots. The Canada Thistle and Perennial Sow Thistle are deep-rooted perennials. But Quack-grass is a shallow-rooted plant, and any treatment that will turn up the roots and dry them will rid you of that pest of the soil. But with a deep-rooted plant like the Canada Thistle or Sow Thistle there may be root stock five or six feet deep. I have heard people say that if you cut the thistle when in bloom it will bleed to death. Don't you believe it. You will have to bleed them to death by getting down a good deal further than you can mow. The root system of a Canada Thistle is like this: About six or eight inches below the surface there is an underground system of horizontal stems which are stores filled with food material; these run in every direction, and from them at short intervals come up every year stems bearing flowers and foliage. Every plant produces flowers in its own season, for which in many cases they have prepared a year before. The Canada Thistle during the first summer stores up food in these underground stems in the shape of little globules of starch—a supply for future use—and that particular future is the next year, when the plant sets to work to produce its flowers and seeds. Cut the Canada Thistle when it is weakest—that is when it has drawn as much as possible out of its food supply bank and before it has replenished it again. When thistles produce seed the stem does not die at once, but, all the time the leaves are green they are storing up food for the next year's work We have some thistle inspectors in Ontario who cut down thistles in mid-summer, and then put up their scythes, thinking they have finished their work for the year. Do not pay these gentlemen for doing that; they have not by any means finished their work. Fighting thistles does not end when you have cut them down in mid-summer. You must cut down the second growth. However, to good farmers the thistle is not a very troublesome pest, as ordinary methods of good farming destroy it. You will not see it on many well worked farms, for if a man will cut it down, and not allow it afterwards to form leaves so as to feed the plant, the thistle must die. If you do not allow plants to feed, they, like animals kept without food, will die of starvation, and your land will become clean.

In the eastern townships they have a very bad weed called "Paint-brush" which is gradually spreading over Canada. You can readily recognize it. It is bright red orange in color, so bright indeed that some describe it as red and not as orange. It is a low-growing weed, about six inches in height, with flowers shaped very much like those of the thistle, but smaller in size, and of a bright, red orange color. The leaves are oval in shape, downy and of a grayish green color. The very valuable pastures of the eastern townships are being crowded out by this weed. The seeds have tufts of down, by aid of which they are blown in every direction by the wind and thus they spread rapidly. I have received from a few points in Ontario specimens of this weed. I therefore warn all

to be on the look out for it You can easily recognize it, and everyone must fight it from the start, for it is a very pernicious weed. This weed is sometimes called the Devil's Paint-brush. This is a good name, for it is very bright in color, but depend upon it that the devil does not try to paint men's farms because he loves them and wishes to do them good. He does not usually dispense blessings. The best remedy for this pest is salt, at the rate of a ton and a half to the acre. This amount may be applied without injury to the grass but with fatal effects on the weed. Mr. Wallbridge, a leading farmer of Eastern Quebec, once wrote to me that if the Experimental Farm did nothing else it would more than pay for itself if it could teach the people how to get rid of this foul weed. However, effective remedies are no good unless the people concerned will use them. The book that is not read will not enlighten your mind; the food that is not eaten will not make you strong; the medicine that is not swallowed will not cure your sickness. Knowledge of insect and plant life is good only so far as you utilize that knowledge in practice.

Ten years ago there was no spraying of fruit trees, and we were losing more than one-half of our fruit. There are many more apples grown to-day than ten years ago, and there is now from forty to fifty per cent. of the fruit saved in excellent condition than was lost ten years ago. And this too, with the poor methods so often practised—mere rule of thumb plans, without care and the best apparatus. Those who practise the spraying of their fruit trees more intelligently, doing it every year, save from seventy to eighty per cent. of the crop. There is enormous advantage from careful treatment of all crops. You cannot grow even potatoes to-day free from the rot and insect enemies without spraying. Anyone can get printed instructions how to prepare and apply these remedies from the Experimental Farms at Ottawa or Guelph by merely writing for them. I sometimes think that farmers get so much for nothing from the Governments of the Dominion and of the Provinces that they really do not properly appreciate their benefits. Of course such men as you who come to these Conventions make use of their knowledge or they would not be here. We know that agriculture in Canada to-day is not what it was even five years ago. We have good men all over the land working to instruct the farmers, and the farmers are in many cases co-operating with them. I know that in my own work I could not perform one tenth of what I have been enabled to do were it not for the practical help I get from intelligent farmers in the various Provinces, who are working with me along the various lines of my investigations. I cannot be in more than one place at a time, but these observers serve as eyes for me, keeping a strict look-out in their respective districts, and by reporting to me are of great help to me and to others. I can assure you, gentlemen, that you have, every one of you, more money in your pockets to-day owing to the fact that after much investigation practical remedies have now been found for most of the injurious insects and parasitic fungi which every year attack your crops.

We have two pests, however, for which we have not yet discovered a remedy and I to-day ask your help in finding a practical remedy. The first is the Wire-worm. Can any man present give me a good plan for dealing with this insect? The only suggestion so far worth considering is to grow barley and rye on land known to be infested, because these two plants are not so much attacked as others by the wire-worm. Late plowing has also given good results but is by no means a perfect remedy.

The other troublesome pest I refer to is the White Grub, which is the grub of the June Beetle. This grub is always very injurious to the roots of various plants, and so far we have found it difficult to overcome in most field crops

A Voice: What about the Horn-fly?

Dr. Fletcher: I don't consider that insect a very serious pest now. It has gone—or almost gone. Grease the cattle with pine tar and lard, 1 lb. to 10 of lard, and the flies will be of little trouble to the animals. It is perhaps hardly necessary to say here that the Horn-fly does not bore into the horn as some people a few years ago foolishly asserted. When the fly is on the horn it can do no harm whatever. However, the fly is no longer a serious thing for the farmer who knows his business.

The Turnip Aphis is an insect which has been giving a good deal of trouble to our farmers this year, and some declare that nothing can be done to stop its ravages. If you think nothing can be done you will do nothing; but I want to tell you that something can be done with this pest. The Turnip Green Fly, or Aphis, appears about the first of August. When you are thinning out the turnips you can soon see where the aphis has been at work. By taking a little pains early it can be overcome. At Ottawa we did it easily by the use of a knapsack sprayer. A knapsack sprayer should form part of the necessary equipment of every farm. For the Turnip Fly use a solution of one pound of whale-oil soap in eight gallons of water, or a kerosene emulsion. Or you can do much good when thinning the plants with your hoe in your hand. Whenever you find a colony of aphides cut out the infested plants, pull a little earth over them and with the foot press down the soil, thus killing the insects.

A MEMBER: Please tell us something about the White Miller, or Cabbage-worm.

Dr. FLETCHER: The insect you refer to is the White Cabbage butterfly. The best remedy is insect powder diluted with some other perfectly dry material. Get a pound of insect powder, costing about 40 cents, and mix it with five pounds of flour, sifted road dust, lime or ashes. See that it is well shaken together, and kept over night in a closely fitting tin canister. The next day take a cheese cloth bag, and as you pass a cabbage tap the bag or stick holding it, and thus shake some of the powder over the plant. Every caterpillar the powder falls upon will die. You will easily kill the caterpillars, and no injury will be done to the cabbage by the operation. A man living not many miles from this very spot told me that some years ago he saved $700 by this remedy in a single year. (Applause.)

A MEMBER: We find that a plant called the Blue Devil grows very profusely in our section. It starts to grow something like a dandelion, but has tall, tough stems with a few large bright blue flowers along them. Is it practicable to overcome it?

Dr. FLETCHER: Yes; that is Chicory. You often drink an infusion of it in the morning, and think it is coffee. It is of the same family as the dandelion, but has not a downy seed.

A MEMBER: This blue plant or chicory got into a field of peas, and almost smothered it. It is rapidly spreading through the country.

Dr. FLETCHER: The land must have been kept in peas for too many years. Rotation of crops is a good method of getting rid of this weed. Some say that weeds are blessings in disguise in thus leading to a good rotation of crops and lots of work on the part of the farmer.

A MEMBER: Where I live this weed is better known as Blue Daisy. It is very productive, and in a very few years has spread over a large area.

Dr. FLETCHER: The flower spreads out something like a daisy, but is not quite so large as the Ox-eye daisy. This latter is also a bad weed. The best remedy for it is to seed down to clover. When you cut the first and second crops of clover hay the seeds of the daisy are not ripe, and when you break up the clover lea you destroy the roots of the Ox-eye daisy, which grow close to the surface of the soil and have no deep running root-stocks.

Mr. D. M. MACPHERSON: I find in feeding cattle that they are often infested with vermin. What cure would you recommend?

Dr. FLETCHER: For lice mix a pound of sulphur with four pounds of lard. What is known as kerosene emulson is also a good thing. Fish oil alone is also a good remedy. These are good for flies and lice both. A repetition of light applications is always better than a single heavy application. For chicken lice put a little of the sulphur and lard mixture under one wing once a week, but do not plaster it heavily all over the chicken or you will kill it. A small lump as large as a hazel nut once a week is ample. At the same time wash the perches with coal oil.

CONTROLLING THE TEMPERATURE OF THE CURING-ROOM.

By Prof. J. W. Robertson, Commissioner of Agriculture and Dairying, Ottawa.

I desire to bring to your attention in a very short speech, an important matter in relation to our cheese trade. This is a Canadian industry that nearly everybody boasts about as having made marvellous progress, and it has for some time past had a most enviable reputation. I am not an alarmist, but I must say that there is a great danger of this trade being lost to us, or being severely crippled, as a profitable business. Ten or twelve years ago the Canadian cheesemakers began to manufacture cheese according to established principles, so that there was some uniformity in shape, taste and texture. This put them in advance of their competitors from other outside countries, and, indeed, ahead of many of the British makers, who, with a few exceptions, were manufacturing cheese by rule of thumb methods. Every dairymaid had a particular method, and kept it a secret from all the rest; and so the home-made cheese lacked uniformity. But these people were not slow to see the advantage of the Canadian system, and to-day they make their cheese more uniform in quality, and being on the spot they have made a closer study of the taste of the people over there than we have done.

Mild Flavors Wanted.—The taste of the British consumer of cheese has changed within the last few years. Once they were willing to eat strong flavored cheese, but now they must have an article that is soft and mild-flavored, and for this they will pay a good price Both mild flavor and rich body are essential to a first-class article of Cheddar cheese. Our English and Scotch competitors are learning the value of both of these qualities. In the same warehouse in Great Britain, last year, English and Scotch Cheddars were selling for sixty shillings per cwt., while Canadians were fetching only forty-two shillings. British dairymen are already taking the cream of that trade, and they will continue to take it, unless we alter our ways by having curing-rooms so regulated in the summer that they will hold an atmosphere as suitable in temperature and moisture as the cool, moist climate of Great Britain. Unless we control the temperature of our curing-rooms we must soon lose our precedence in the British markets. The temperature of the average English or Scotch curing-room from June till September is about 61 or 62 degrees, and that enables them to cure their cheese without much drying out; and the consumer is being accustomed to that soft, mild quality of cheese. The fastidious taste of the Englishman has been cultivated for cheese cured at the low temperature. There are flavors and flavors in cheese. Some of us have eaten cheese with a fierceness of flavor that would have been as formidable as a gatling gun if trained on people with refined tastes. (Laughter and applause.)

Cool Curing-Rooms are Necessary.—We must make cheese according to the taste and wants of the British cheese eaters, and not according to the present day condition of our curing-rooms But I fancy I hear a cheesemaker say: "But I have to make my cheese dry and hard, or else they will puff up" Well, my friend, if you do so you simply make what the British consumer does not want to eat. I can assure you that if you make cheese of that kind, and it is put into a warm railway car, and is carried in a warm ship to England, it will sell for 38s., when soft mild-flavored cheese, cured at a lower temperature, will command 60s. More attention must be paid to the cheese after they are put on the shelves of the curing-room, but the temperature should be first made right. I have known curing-rooms where the inside thermometer followed the outside thermometer faithfully. In some of our curing-rooms the thermometer goes as high as 90 degrees. If the temperature gets to that point in a room where cheese is kept it will start fermentations or activity of bacterial life of the wrong sort, and bad flavors will be the result. Although you may get the temperature down to 60 degrees thereafter these injurious forms of life and their products will still exist in the cheese. Therefore we should aim to keep our cheese always as low or lower than 65 degrees.

The heating of the curing-room is nearly as important as the cooling. In some factories they have a big stove in the middle of the curing-room, and the cheese near the stove are almost roasted while those away back are at a temperature of 50 degrees. If the curing-room is kept too cold for a week the cheese kept in it during that time will develop a bitter flavor. The low temperature keeps the bacteria that make nice flavors from being active, and gives those that make bitter flavors a chance to be active. You cannot make good cheese regularly unless you can regulate the temperature to between 60 and 65 degrees. Looking at the question from the standpoint of the British market—and, indeed, of any market—very low temperatures or very high temperatures are both bad.

Improvement by Insulation.—The most important matter in the cheese business in Canada to-day is the getting of the curing-rooms of our factories in proper shape for the best work. And how can this improvement be effected? It is not very difficult. We need only a temperature of 65 degrees all the time. Two years ago last summer we made an effort to keep the temperature of the storerooms at the Government Creameries down to 35 degrees; and we did so. There are now about two hundred creameries in Canada where the summer temperature of the store-rooms can be kept at from 35 to 38 degrees. Therefore, it should not be very difficult to construct cheese curing-rooms which may be kept at 60 degrees all summer. You could not keep the temperature of the butter-room down to 35 degrees, even if you made the walls twenty feet thick, if you left apertures all about the room big enough for cats, or even mice or even flies, to get through. (Laughter.) Nor could you keep the room at that low temperature if the windows allowed everything else but light to enter. Light should be arranged for in a curing-room.

The first improvement towards lowering the temperature of a curing-room is not to build an ice-house, but to put on double windows, and keep them on all summer; and see that there are double doors on, too. It is as much use to have double doors and windows on in summer to keep the heat out, as it is to have them on in winter to keep the cold out. The walls, ceiling and floors of the curing-room should be closely constructed. This can be done by putting two thicknesses of building paper over the sheeting on the inside of the studs and tongued and grooved lumber an inch thick over these. That is all there is about it. What is the use of a man having a big purse if there is a big hole in it for his money to slip through? This improvement of windows, doors, floor, walls and ceiling is the first thing to be considered in making an up-to date curing-room.

The President: That means a new curing-room. You have the whole blessed thing mentioned. (Laughter.)

Prof. Robertson: Well, that is one way of putting it; but I would coax a child to go up stairs a step at a time rather than tell him he is to leap from the bottom to the top. The inside of the curing-room should be whitewashed. Even taking the clear part of the slaked lime and applying it to the walls will destroy the fungus of mould; and in that way you will largely prevent mould on the cheese.

Cooling by Sub-earth Air Duct.—Having got the room close and clean, how can you get and maintain a low temperature at the least expense? How do people generally manage these things? You remember the way the first settlers did. They simply dug a hole in the earth. I believe that if you could get the curing room down in the cellar filled with good light, you would cure cheese with hardly any loss of weight. The loss of moisture in cheese means a loss of quality as well as a loss of weight.

I would, therefore, recommend to you what is now called the sub-earth air duct. I have been using this plan and advocating it since the summer of 1882, and I lately found in a western paper that some one in the United States had just invented the process. (Laughter.) I suppose he got the idea from Governor Hoard, who a few years ago saw those in operation in the Government cheese factories in Prince Edward Island. By means of this sub-earth air duct you can lower the temperature in warm weather in a very short time as much as ten degrees or more. The duct is made thus: A drain or duct is brought in through the floor of the curing-room in two places. This duct should not be less than 100 feet long, it should be at least five feet deep in the ground, and the

opening for the passage of air should be about 100 square inches for every 5,000 feet of cubic content of the room. It is best to have it made of tiles, but planks will do. At the far end of the duct there should be an upright opening with a hood or cowl that would be turned to the wind by a tail. This plan will lower the temperature of the curing-room about 10 degrees or more.

Ice could be brought in as a supplementary means of cooling during the three or five weeks of midsummer, or when the weather was unusually hot. We have found that with no special provision for forcing in air, but merely having a shaft at the outside opening with a cowl or hood on top, the current of air in the curing-room has been strong enough to blow out a match. The tiles have a tendency to lie damp, and in order to prevent mould resulting I would advise the putting of some formalin in a vessel where it would be sucked in through the tiles once or twice in the season. That kills the germs of mould as it passes through the duct.

Ice as a Supplementary Cooling Agent.—I find that it has cost us eighty cents a ton to store ice. We have ice stored at nineteen creameries in the Northwest at a cost of from 65 cents a ton upwards. Taking Ontario figures, the fifty tons of ice necessary for a factory with an output of one hundred tons of cheese would cost only $40. I would have an ice-rack in the curing-room, and put in ice it needed, to keep the temperature below 65 degrees. The rack would not have to be filled every day, and often not more than once a week. Cooling the room with ice is just like a man warming a room with a stove —sometimes much fuel is needed, and sometimes none, owing to the outside temperature. The speaker here exhibited some plans for fitting up a curing-room according to the suggestions made in the course of his address, and said they could be obtained free on application.

Estimate of Some Costs.—He proceeded: All these improvements can be effected at a cost of from $125 to $200, according to locality, and the price of labor, lumber, etc. Now, taking a factory that turns out about 300 cheese per month, and applying to it all that I have been advocating in this talk, there would be a saving in shrinkage of about a pound per cheese, and you would also get a better article and consequently a better price. These together would mean a gain of about $450 a year. Then, your cheese would be of so good a quality—not bitter, not gassy, and not greasy—that the demand for Canadian cheese would be strengthened in the British market. This, added to the fact that the saving in one season would more than pay for the cost of the improvements, is an argument that should prevail with every intelligent dairyman. (Applause.)

The Temperature and Bacteria.—Dr. Connell, of Queen's University, has been doing a good deal of valuable work for the dairymen of Canada. He has found that in the best of milk there are some particles of cow manure, from the skin of the cow, the building, or the milking-yard. However, such milk may be pleasant enough to taste and smell if it is kept cool, and no chance is given for the bacterial life in the milk to develop. But when the temperature gets above 75 degrees these bacteria (the coli) grow active, and develop offensive odors. Therefore we must not let the temperature get above 75 degrees. A difference of 1½ cents a pound has been estimated between the values of cheese made in the same factory, and from the same milk, but cured at different temperatures. We often hear the market report 40s. for Canadian cheese with the coli flourishing, and 60s. for the English or Scotch cheese with the coli sleeping peacefully on account of the cooler temperature. (Laughter and applause.)

The Heating of Curing Rooms.—To heat the curing-room evenly I would recommend a galvanized iron or tin screen or jacket put around the stove, and about eight inches from it. This screen should come to within six or eight inches of the floor. The heat would thus suck up the cool air near the floor, and carry it up to the ceiling. In passing to the floor again it would circulate in a very beneficial manner. The screen could have a hinged door, so as to enable you to renew the fire; or you could so arrange the screen that the whole thing could be run up or down from the ceiling, so as to give the fullest access to the stove.

Rapid Growth of Business.—We have made a great growth in the number of cheese factories in Canada. In 1871 there were only 353 factories; in 1881, 709; in 1891, 1,565, and in 1897, 2,759. As for creameries, in 1871 there were none; in 1881, 46; in 1891, 170, and in 1897, 559. Our Department proposes to improve a part of the curing-room in one or two cheese factories in each Province. We shall assist in providing a well-equipped curing-room, with sub-earth air duct, etc, and arrange that cheese made from the same milk and under the same conditions be cured, some in the improved curing-room and some in an ordinary curing-room. These cheese shall then be sold in the market according to their value, and the relative prices will show what value the British buyer attaches to the curing of cheese in a low or high temperature. This may enable our farmers and cheese makers to see the importance of having their factories put in the best condition, and thus we hope to be able to retain the prominent place we have so long held in the British market. (Applause.)

A Member: What kind of tile would you recommend for the sub-earth air duct?

Prof. Robertson: The ordinary drain tile, from three to six inches in diameter. It is not necessary to have it glazed.

Mr. E. L Aderhold (Wisconsin): I saw a factory last summer where the curing-room was cooled and ventilated by the well. The well was only about three or four feet in diameter, and was about forty feet deep. The well was covered air-tight, and the wind was caught by a cowl and forced into it. A pipe was laid from within a few feet from the water to the top, and then into the curing-room. I was in that curing-room one day in the middle of August, and the air was about 55 degrees. Before that the temperature used to be 65 degrees on such a day. There was no ice used.

The President: I consider this address of Prof. Robertson's one of the most important ever delivered to Canadian dairymen. (Applause.) We must advance along the lines laid down by him. The British people will not make any difference in their market prices in favor of Canada, although we know they think we are a lovely people. (Laughter.) The governing of the temperature of the curing-rooms of our factories is a most important point to consider.

Mr. D. M. Macpherson: This question of curing cheese, presented to us so ably by Prof. Robertson, is the most vital question of the day to Canadian dairymen. We are more deficient in this very matter than in anything else pertaining to our great industry. I was both amused and edified by the references of the Professor to the bacilli or coli working in the warm temperature and sleeping in the cold. Some dairy bacilli work in cold weather. For instance, those pests who go about starting small factories in winter. (Laughter and applause.)

The President: The "Devil's Weed" among our clover. (Laughter.)

Mr. Macpherson: Yes; you could not better describe them. Small factories are the bane of our business to-day. With our improved apparatus there is now no need for them; they are an evil. We cannot too fully denounce them. Quebec will suffer from that cause, too. If we have larger factories our cheese will be better, because we can more thoroughly equip these factories, and so make a more even quality of cheese. I approve of the suggestion of Mr. Aderhold. It means simply to run your air duct through the well.

The President: The summing up of the whole matter is this: Build your factory in the latest style, and have it so equipped that you can make dairy goods every day in the year; making butter or cheese as it pays best, and trying to make the best article in the world.

BACTERIAL INFECTION OF CHEESE.

By Dr. W. T. Connell, Professor of Pathology, Queen's University, Kingston.

Milk and its products, butter and cheese afford excellent food material for the growth and rapid multiplication of those species of microscopic plants, which we term bacteria, germs or microbes. If we examine milk some hours after milking we will find large numbers of bacteria as a fairly constant factor. Further we find that in and about dairies and factories certain species of bacteria are found to flourish abundantly. If the cows, the milk sheds and the factory are well and cleanly kept, then only those species of bacteria which are commonly associated with milk, and which induce those processes which we look upon as natural as *e.g.*, acid production and souring in milk, will obtain a foothold. If, however, the reverse be true, viz.: that little care is taken to keep the milk free from filth, dust or hairs during milking—if the milk is kept in a place exposed to stable, yard or road dust, or is made at a factory which in itself or its utensils and surroundings is not cleanly kept—then we will often, yes, usually, find that the species nominally present will have to enter into competition with these bacterial forms which flourish in such filth or dust. For let me here point out that bacteria are the cause of the decomposition of most organized matter, and in consequence to them we must look as the source of odors which arise during decay. The dust which arises from decomposing matter will of course be laden with the bacteria inducing such decomposition and falling upon other good material such as milk, will tend to reproduce in it conditions allied to those which were produced in the material from which it came.

Last year I read a paper before this Association which took up the general nature and character of bacteria, and recited a number of conditions in which they were found to be the cause of trouble. During the year just past I have continued working along the same line as the year previously, and I find that my results are confirmed by this year's work. I want to emphasize—and I cannot do so too strongly—the importance of a certain form of bacterial infection then pointed out, *i.e.*, infection with bacteria which have their most common and constant habitat in the excreta of animals and fowls, and in dusts which contain dried particles of such excreta as stable and road dust. There can be no doubt that infection from such scurces is the most common cause of trouble with which the cheesemaker has to contend. From this source comes mainly such condition as bad or "off" flavored and gassy milks, pin-hole and gassy curds and the common "off" flavored cheese. In my examination of these conditions, the results of which are abundantly confirmed by the reports of other investigators, I have almost constantly found one or other variety of that species termed bacillus coli communis—a constant inhabitant of the intestine of animals. As these conditions which can be ascribed to this organism are certainly the most common and important with which the cheesemaker has to contend, necessity for a remedy is manifest. With a knowledge of the source of such infection, the indications for prevention are plain and can all be summed up in the term "general cleanliness." During this past summer I have had the opportunity of examining into several interesting forms of bacterial infection of cheese.

Early in August last I obtained some specimens of cheese from a maker in the county of Peterborough. I had best describe the trouble in his own words. He says:

"The trouble appeared first in the cheese made during the latter half of May, and was the worst in the make of May 20th. For the first two weeks after making the cheese are close, smooth, soft and to all appearance, right. About the end of this period they begin to harden to the touch, get rough in grain, cut in color and develop acid, but differ from a sour cheese. At about the end of three weeks they begin to run a clear briny fluid, at times like water, again somewhat syrupy. The cheese run a variable length of time and become very dry. The trouble continued variably throughout June and the early part of July."

A starter had been used in this factory but was discontinued on July 16th. The cheesemaker notes that no method of working the curds, nor did the amount of acid produced, seem to have any influence upon the trouble. In fact he says: "I kept careful notes but they only tended to confuse me." I obtained samples of early July cheese, some of which showed this condition and other samples from cheese which had not developed it, but which were made about the same time. I found a form of bacillus in large numbers in the "diseased," cheese, and comparatively few of the same bacillus in the "good" cheese. This bacillus belonged to a widespread class of bacteria being one of the putrefactive species. There is no doubt in my mind that this cheesemaker's "starter" was the cause of the continuance of the trouble in his factory. The starter became more or less contaminated with this bacillus and kept the infection alive. The trouble disappeared with the discontinuance of the "starter." I should add that the rennet used was carefully examined, and no organisms were obtained from it which at all resembled those found in the cheese. This instance of a bacterial infection through a "starter" is interesting, in that it shows clearly that as starters will propagate those life forms which they contain, hence the great care necessary in the preparation of a starter. In fact I would strongly advise where a starter is used the use of pure cultures to begin with, and of pasteurized milk always to continue the starter. Even then it would be necessary to be extremely careful, and to renew the starter occasionally.

Early in September I was asked to visit a factory in the county of Northumberland where the cheesemaker was having trouble with "open" cheese and a bad flavor. The cheesemaker stated that he was careful in inspecting the milk brought, and that his patrons had special cans in which to take home their whey. Further, though he had had a long experience, he and some other experienced makers whom he had called in could not make good cheese. The factory was found to have two floors, and the lower floor, resting on the ground, had become decayed. Upon it were laid scantling, and then the upper floor. In four places this upper floor had broken through, leaving gaps, the largest one of which had an area of about 6 square feet. In these gaps and lying upon the lower floor was a putrid slime measuring $1\frac{1}{2}$ to 2 inches in depth. From all appearances this same material was to be found everywhere between the two floors. The factory was also the home of myriads of flies, and the cheesemaker stated that he had destroyed them by millions. The drain leading from this factory opened at the rear and contained decomposing whey, etc. The trouble continued in all weather. I examined the cheese, and also the putrid slime so freely exposed in the gaps in the floor. In the cheese I found large numbers of a foreign bacterium, in fact a bacillus which produces a foul smelling gas. I found as well the usual acid-forming varieties of bacteria. In the slime, which was simply a seething bacterial mass, I readily isolated large numbers of colonies of the same bacillus as was found in the cheese, besides certain other bacteria and moulds. Fewer colonies of these latter developed than of the gas forming bacillus. At the time of my visit I stated to the cheesemaker that I believed the exposed putrid slime was the source of infection, and that the flies acted as the infection carriers. The flies would alight upon the slime, get their feet and bodies covered with this bacterial-laden material, and then being disturbed would again alight upon the vats or factory utensils, o directly into the milk in the vats when uncovered, and thus transfer the bacteria to these points and infect the milk during manufacture. Flies, have, indeed, at times transferred disease germs in this manner, as is seen from the report of thei nvestigations into typhoid fever in the military camps of the United States, published last autumn. As the slime contained large numbers of the same bacterium as was found in the cheese, and as this bacterium is foreign to ordinary cheese, our circle of proof is fairly complete. For we have the trouble in the cheese due to a bacterium present in exposed slime on the factory floor, and we have myriads of flies capable of transferring this slime to the vats and milk. I think from this instance it would be well in future for cheesemakers, and in fact all interested in this matter, to bear in mind the importance of flies in carrying material from point to point, and thus leading to infection. Material from any foul drain or stagnant pool, or in fact from any decomposing material in the neighborhood of a factory, or exposed milk or milk vessels, might thus be transferred into the factory or

into the milk. Usually, however, when external to the factory, such minute amounts will be carried, as not to lead to any trouble as such are unable to compete with the vast numbers of the ordinary species present in the milk or cheese.

I was requested this summer to look into the question of the possibility of tainting of cheese from the "coloring" used. As is well known these coloring fluids are put up in strong alkaline solutions which are quite strong enough to render them somewhat germicidal. To test this matter, however, I have repeatedly examined samples of coloring from various sources, and always found them to be free from bacteria. This of course excludes the possibility of bacterial tainting from this source. There remains the possibility of tainting directly from the coloring, but such a comparatively small amount of coloring is used that such a taint would necessarily be very slight, and if suspected could be readily determined by deluting the coloring in water and then tasting it; or better still soak some such material as bread in this diluted solution and tasting that. Coloring fluids as now put up can then be excluded as a source of tainting.

Mr. Macpherson: An important question arising from this discussion is the part played by flies in conveying matter of an injurious sort to the cheese during the process of manufacture. The moral of the argument is not to allow flies to fall into the milk. But how is the cheesemaker to get rid of flies in his factory?

Dr. Connell: We cannot well keep flies out of cheese factories. The moral of my address is to keep the surroundings, as well as the interior of the factory, clean. The only remedy for flies in the factory is the free use of insect powders.

Mr. Publow: Suppose that the patrons of factories do not draw the whey back in the milk cans, but that in keeping their milk they allow the cans to stay beside swill barrels, would there not be a danger of some hurtful bacteria getting into the milk from the adjoining swill?

Dr. Connell: Bacteria will not fly; but of course bad odors would be transferred. If flies got into the milk from the swill then great harm would be done.

Mr. Aderhold: In the case of the souring, was it also caused by a germ?

Dr. Connell: Yes. There are fifty or sixty forms of bacteria which will develop from decomposing matter about the stable or cheese factory. Some are derived from decomposing foods—some of them from decomposing ensilage.

Mr. Aderhold: I find that where there are good, cool curing rooms this trouble is not complained of. Do you think this condition would result in the case of pasteurized milk?

Dr. Connell: No.

Mr. Aderhold: That is correct. I have come to the conclusion that the starter is not a fit one to use unless made from a pure culture and from pasteurized milk.

Mr. Publow: Where the cheesemaker is troubled with tainted milk or gassy curds would it not be a benefit to use a good flavored starter?

Dr. Connell: I think it would.

Mr. Aderhold: In the special course in cheesemaking at the Michigan Agricultural College, which I have been directing, we made a demonstration in the month of December which I think will cover this question. We had a bacteriologist make a sour culture, and I prepared a gassy starter. We put the gassy culture into both vats, but the sour starter was put into one only. We had a fair curd in the vat in which the sour starter had been put—fair both in flavor and texture; but in the case of the curd from the other vat, the texture was like honeycomb and the flavor was very bad. I am a great advocate of the use of a good starter when there is any trouble with taints or gases.

Mr. Rogers: Did the trouble cease when the cause was removed—when the drains were made in the case reported in the paper read.

Dr. Connell: The holes in the floor were covered up, and I believe a better article of cheese was made; but I have received no account as to the exact quality of the cheese. But I know there is a law suit to make the cheesemaker responsible for the loss of the summer's make of cheese.

Mr. S. Stephenson: I have had milk turn lobbered when it was perfectly sweet.

Dr. Connell: What do you mean by "lobbered"?

Mr. Stephenson: To be thick, and yet be perfectly sweet.

Dr. Connell: There are a number of bacteria that will thicken milk without souring it, but I could not say that was the case in this instance.

Mr. Derbyshire: This is an important question, and it is a perfect shame that in a country like this there should be a factory situated like the one referred to to-day. There should be proper drainage, and the factory should be kept bright and clean, while the curing-room should be so governed regarding temperature as to keep the cheese in best condition. I think that this would have the effect of doing away with many of these small factories. The situation of a factory cannot be too carefully selected. It should be well built, thoroughly equipped, and be in charge of the best possible man. There are some men who are only "microbes" after all, walking about very actively in winter, offering to make cheese for less than cost, practically. If Dr. Connell can show us how to get rid of these human microbes we will give him a gold medal. (Laughter and applause.)

A VOICE FROM WISCONSIN.

By E. L. Aderhold, Instructor with the Wisconsin Dairy Association.

According to John Billings there are two things that people are never fully prepared for, and these are—twins. He might have added one thing more, and that is the making of an impromptu speech. Speaking in the language of my profession, there is as much difference between me and a speechmaker as there is between a milkweed and a cowslip.

The best advice I can give you people of Canada is to do just as Prof. Robertson and these other able leaders in dairying tell you. Your Federal and Provincial Governments have been doing a good deal to assist the dairymen of this country. Over in Wisconsin the Government does not help us much. We get a little State aid directly and a little indirectly. I wish to say a few words in corroboration of what Dr. Connell and Prof. Robertson have said in regard to the shrinkage of cheese. We have a few good sub-earth air ducts in Wisconsin, built very much in the style advocated here, although perhaps a little larger. They are going day and night. I think Prof. Robertson was a little modest about the shrinkage of cheese. In Wisconsin the shrinkage is about 2½ per cent., and much of this is saved by the improved curing-room. Not only is the air controlled by the sub-earth air duct, but also its moisture. Air can contain only a certain amount of water at a given temperature. When the heat in the air is reduced the power of the air to absorb water is also reduced. When the air enters the pipes of the duct through the cowl it is sent under ground and becomes cooler, and enters the curing-room saturated with water—almost as moist as air can be. The air of the curing-room is warm, and that increases its capacity for holding water. The air coming in has a moisture of almost 100 degrees while that of the room may be represented by about 85 degrees.

I saw in one factory an interesting system of cooling and ventilating. They had an ice-house built at one side as an adjunct of the curing-room. The curing-room had a ventilator, and there were two openings in the door leading from the ice house to the curing-room. The air thus circulated around the house. The cold air went downward, and the only place it could come through was into the curing-room. That was

automatic ventilation, and it did very good service. If during the four warm months of the summer we had these sub-earth air ducts in operation our cheese would be worth at least five per cent. more money to us. I hope none of you will be afraid to try what Prof. Robertson has asked you to do, so far as improving the curing-room is concerned. Success and not failure will attend your efforts if you carefully follow the instructions given. If we can get patrons to practice clean methods of milking we will have removed one of the greatest obstacles in our way of making a first-class article of cheese or butter. In the city of Berlin, Germany, the settlings of the milk consumed are said to be sufficient to fertilize a forty acre farm. That looks a lot, but if you will examine the last milk coming out of the cans at the average factory you will feel that the Berlin result has not been largely over-estimated. Patrons are supposed to take good care of their milk, and bring it in clean and pure, and the cheesemaker is expected to understand his business, and handle that milk in a way to make the product first-class. Now, if the cheese is all right up to that point, but it is placed in a place where it will be damaged while maturing, it is a big piece of foolishness. These poor curing-rooms should go. If I was a patron, and a cheesemaker were to put the cheese in such a place, I would stir up such a row that the patrons would insist upon getting a better state of affairs.

A MEMBER: Is it necessary for every patron of a factory to have an ice-house?

Mr. ADERHOLD: No.

Mr. L. L. GALLAGHER: If you take the best milk that was ever strained, is there not some amount of sediment in it if is left standing long enough?

THE PRESIDENT: It did not come in the milk; it came from the outside. The cow has too large a sense of shame to permit that. The care and surroundings decide the quantity of sediment in the milk.

Mr. D. ROGERS, M.P.: Did I understand you to say that the State Legislature of Wisconsin does not assist the dairymen at all?

Mr. ADERHOLD: The State assists indirectly. We have a Wisconsin association that deals only with cheese. We do not let a man talk about butter-making. We shut him up at once, for it takes a man only a day and a half to learn how to make butter. (Laughter.)

THE PRESIDENT: What do the buttermakers over there say of the cheese men? (Laughter.)

Mr. ADERHOLD: We make many kinds of cheese in Wisconsin—Limburger, Swiss, chimney brick—but mainly Cheddar, or cheese like the Canadian. Some factories pay the maker by the amount of cheese made, and some by the season. Wisconsin has gained a good deal by the experience of Ontario. But we have some men over there who have done something for Canada and the dairy world—such men as Babcock, Russell and Hoard.

THE PRESIDENT: Ex-Governor Hoard would be here now were he not ill in bed. We miss him greatly.

THE CANADIAN HOG INDUSTRY.

Prof. J. W. ROBERTSON, Agricultural Commissioner, Ottawa, gave a very full and instructive address upon the hog industry in Canada, in which he predicted a large increase in the amount of bacon imported into Great Britain from this country. He also advocated the fattening of poultry for the British market. This address can be found in the report of the Live Stock Associations.

CANADIAN DAIRY PRODUCTS IN ENGLAND.

By Hon. Sydney Fisher, Minister of Agriculture, Ottawa.

After a few words of introduction, in which the speaker expressed his pleasure at being privileged to be present and address so large and representative a gathering, Mr. Fisher proceeded to say: Not only have I derived pleasure from meeting with this Association in the past, but I have also gained much helpful information from your discussions, which has enabled me to carry on my own business as a dairy farmer with greater success. (Applause.) I am glad to see so many practical dairymen here, for the dairymen of Canada are perhaps the most enterprising, the most progressive and the most advanced farmers in the country to-day. It is in dairying that we find the highest development of agricultural progress and industry. I say the highest development of agriculture, because it is by dairying that we carry to their greatest height the manufacture of the crude products of our soil. In this great branch of agriculture we have the smallest weight of agricultural produce done up in a form that is of the highest value per pound; and this shows that the dairymen of the country are those who are putting the most thought and skill into their work, in shipping off their farms the least of the crude products, and leaving the most behind in the soil for the future. This class of work requires the highest intelligence and skill, and that is why I dare to arrogate the position of our being those farmers who are most enterprising and who display the highest skill in our work. This eastern part of the Province of Ontario has taken the lead in this industry for a long time back. It is true that at first the home of the co-operative cheesemaker was in the western part of the Province, but the east soon followed and caught up to it, and to-day dairying is the leading industry among the agriculturists of this section. The friendly rivalry existing between the eastern and western parts of the Province of Ontario in the matter of dairying is one of the reasons why the industry has made such remarkable progress. Such emulation is productive of good when wisely directed. We in the Province of Quebec are flattering ourselves that we are following very closely in your footsteps, and we feel that in some instances we are close indeed upon you; but we owe much of our advancement to this Province. (Applause.) It is satisfactory to be able to say, that in agriculture we find something that has largely helped to do away with that prejudice of Province, race, etc., that in the past has kept men from meeting together for their common good and to discuss mutual interests. Such gatherings as these know no division line of county, Province, politics or any other local or individual matter. (Applause.) It is because you farmers have been coming together to advocate your business that the spread of agricultural information has been so great over the country in recent years; and it is owing to the spread of that information, through the press and in Government reports and bulletins, that our Canadian farmers have been able to make the remarkable progress that has characterized their work of late.

Last summer it was my duty as Minister of Agriculture to make a trip to Europe for the purpose of finding out what was most needed in the way of improvements in our agricultural products, so as to meet all the requirements of the great British market, and to meet the competition that is now coming from all parts of the globe. Prof. Robertson and I visited the markets together, and investigated along these lines. We were glad to be able to lay before the people of the old land some of the progress that Canada had made. I was extremely gratified and proud, not only in my capacity as Minister of Agriculture, but as a Canadian, that the people of the Old Country were eager to learn about what we were doing here, and that they were really so interested in us that they were taking hints from us in their own work. We are apt to think that the people of Great Britain are not progressive, but a visit to that land will greatly disabuse one's mind of that opinion. The progress now being made there in every branch of agriculture is really marvellous. They are learning from the practices of their competitors from the outside world. They have absolute free trade over there, and they take in and are glad to get the products of the people of every nation and tongue. They are quite willing that the

Canadian farmer and Australian farmer should send in their goods without let or hindrance, and also that the people of every land should do so, too. But the farmers of England are beginning to find the pinch of competition and hard times, and they are anxious to learn all they can about improved methods wherewith to meet this great tide of competition pouring in from the whole earth, and so lessen the grind of the hard times. Let us take a lesson from them in this regard, and go on to improve our methods as far as we can.

Another thing that struck me while in Great Britain was the great favor shown towards Canada and Canadian products. I think I can attribute this to a large extent to the Jubilee demonstration of 1897. Then, for the first time, we made a definite impression upon the minds and hearts of the people of the old land, first by our offer of preferential trade, and second by the place taken by our Premier among the representatives of the Colonial Empire. (Applause.) But, putting aside altogether the sentimental side of the question, putting aside the Imperial spirit which has helped to bind the Empire together—putting all that aside, there was a feeling among the people of England that Canada had done the square thing by them, and that it was their duty to do the square thing by us, and give us the very fullest access to their markets. I had confidence in the years back that if we could only once induce the people of the old land to taste our dairy and other products of the farm they would like them so much that they would ask for more. And so it has been. They have tasted, they have appreciated, and are asking for more, and during the year past the development of our export trade to England has been wonderful. The prosperity of Canada to-day is obvious. We do not need to prove it by figures; the people can feel it in their pockets. What is the reason? It is because we have been able to export nearly twice the amount of agricultural products that we ever did before, and these extra millions of dollars have circulated among the people and have made them to feel prosperous where before they felt the hard times. It is a proud boast to make that this is due to the increased production of the agriculturists of our land.

One thing that may be to a certain extent a jarring note in the encouraging words I have just spoken is that, for the first time in many years, there was some complaint made regarding the quality of Canadian cheese. You know how it is in the matter of the importation of cheese into Great Britain. Our cheese still occupies the proud position of being the largest amount sent to the old land of all the countries in the world. But we have suffered from the heating of cheese in the curing-room. It may be also that we have suffered from cheese heating on the railway cars, in the warehouses and on the ships; but I firmly believe most of the injury from heating has been in improperly constructed curing-rooms. I know it very frequently happens that cheese are sent out in very hot weather in poorly ventilated cars, to be taken to the place of shipment, and in this way they are seriously injured. I think, however, that united effort on the part of your Association could induce the railways to put better cars at the disposal of cheese shippers. It is important, also, that there should be better ventilation in the holds of the ships carrying our cheese across the ocean, so that any foul air entering the hold should be removed and so not affect the cheese. Prof. Robertson has been in communication with several ship owners, and during the last few months a number of vessels have had electric fans put in for improved ventilation. I am satisfied, however, from investigations I have been making, that most of the injury to cheese from heating has occurred in the curing-room of the factory. The injury having started there may often have been increased during the transportation by rail and ship. The improvement of our curing-rooms is something that is within our power to control, and I feel assured that the dairymen need only to have the remedy pointed out in order to apply it.

Our butter sent to England this year has shown a great increase not only in quantity, but an improvement in the quality has led to increased prices. A comparison of the price obtained by Canadian butter in competition with Danish and Australian butter—our two great competitors—is greatly to the advantage of our own make. And knowing as I do know that our Canadian butter has been made in factories or creameries for the last few years, I think I can claim that much of the improvement in quality and price when brought

to Great Britain is due to the improved method of transportation by cold storage. Canadian butter in years gone by was well made, but it did not reach the British consumer in the same condition. But now, by our improved system of transportation and cold storage, our butter is kept at its best quality until it reaches the hands of the English retailer. Leading English buyers have told me that if we can maintain the excellent standard now reached in our butter-making there is an unlimited market for it over there. Now, without claiming the gift of prophecy, I would say that our cheese business with the mother country is not likely to be enlarged to any considerable extent. Last year we did not make as much cheese as in the preceding year, although most of our make was of just as good a quality as formerly. In fact, we shall have to improve the quality of our cheese by having better curing-rooms if we are to keep our present large cheese trade with Great Britain. The extent of our cheese business in that field, then, has practically reached its limit, for to-day we are sending between 60 and 70 per cent. of the entire cheese import of that country. But we have been increasing the number of our cows, and the average capacity of the cow to produce milk. Now, what are we to do with this increased amount of milk? If we are not going to enlarge our cheese output we shall have to turn it into butter. It is therefore a providential thing that we are sending butter to England, and that it is becoming so popular there that the English dealers are assuring us that if we continue to maintain the quality of the excellent article sent there this year there is an unlimited trade for us in that branch of dairying. So, then, our butter product is likely to utilize the increase of milk. I am not in this casting any reflection upon the great cheese industry. We will be able to send as much cheese as formerly, but we must maintain its quality, and even increase it in that respect. The cheese business has brought much credit to the country, and will continue to be one of the largest sources of farm revenue.

The by-products of our dairy business are of importance. During the last fiscal year we sent $8,000,000 worth of bacon to Great Britain, or about twice as much as in the preceding year; and I venture to say that in the next two years we will double that again. (Applause.) Last year we sent about $17,000,000 worth of cheese, and I have no hesitation in saying that three years from now we will also be able to send that amount of bacon, if not more. The excellence of our dairy products is the foundation of our immense trade with the people of England. Without excellence of quality we can do nothing; with excellent quality of goods we can command their markets. There is nothing more striking to a visitor to the old land than the enormous wealth of that country. The people are well off; money is plentiful. The laboring classes are evidently much better off than they appeared to be when I was there several years ago. The people who then had bread and cheese for a meal now eat bacon by the pound. There seems to be no limit to the possibility of their consuming this kind of food, and the same character we are now earning for our bacon and butter, we have long gained for our cheese. I again predict that our butter and bacon trade with the old land will double within the next three years. (Applause.)

CHEESE-MAKING.

By Thos. J. Dillon, Charlottetown, P.E.I.

The cheesemaker, if properly qualified, is a very important man in the community. A successful cheese factory brings in a lot of money, and a factory will not be successful unless the maker is competent. He should, therefore, be a man of well trained judgment and excellent natural ability, should be well informed and have a good knowledge of human nature, besides being thoroughly posted in his business as a cheesemaker.

In most professions the operator has the raw material in about the same condition from day to day. Not so with the cheesemaker. His raw material—the milk—is never the same. He will not get two vats exactly alike, even on the same day, and to make a

uniform cheese from the different qualities of milk requires good judgment and great care. Then he has the best interests of the patrons of the factory to consider. Some patrons will take proper care of their milk, and see that it is always sent to the factory in good condition, while others will be careless, allow their cows to feed on what they should not, or are not as careful about milking or handling the milk as they should be, and when it arrives at the factory, the maker finds it is not fit to make first-class cheese. It is his duty to refuse, and not accept, such milk, whether it be from the largest patron or the most influential man in the company, just the same as if it were from the smallest patron or meanest one. So you see the cheesemaker needs to be a just, upright, impartial man, and he should be courteous also. If a can of milk smells badly, it is not necessary to say it is rotten, vile, etc., etc. Such expressions are apt to offend the owner and drive him away from the factory; whereas, if he were carefully advised that his milk was off in flavor or quality not right, he might get interested, and finally become one of the best supporters of the factory. The cheesemaker should impress the patrons with the idea that their interests and his are mutual, and as he knows more about milk, and how it should be handled than they do, should try and lead them to a better way, and not attempt to drive them. A cheesemaker with intelligence, tact and good judgment, will build up a business where one lacking those qualities will fail. Thus you see the success or failure of a factory depends very largely on the manager.

A cheese-maker should be a bit of an engineer, understand how to care for and manage his boiler and engine so as to get the best out of them for the fuel consumed, and have them last a long time. There are times, too, when he needs to be very quick in his decisions and actions, and others when he needs to exercise great patience. So much by way of leading up to my subject. Now for our talk on practical cheese making.

After the factory has been fully equipped, with the weighing can on a good set of scales, a nice clean strainer on a clean vat, scales properly balanced—we are ready for the milk. The manager of the factory should take his place on the weighing stand, examine each can of milk as it is emptied into the weighing can, refusing any that will not make first-class cheese. Put a sample in the composite jar for the Babcock test—(all milk should be paid for according to the fat it contains). Weigh carefully, and credit the patron with every pound he delivers. As the milk is being weighed in, the temperature should be gradually raised to eighty-five degrees Fahrenheit. The milk should be stirred gently to keep the cream from rising, and to insure an even temperature. When the vat is filled, if the cheese are to be "colored," add the necessary amount of coloring matter, and stir well so as to mix thoroughly. Do not apply the rennet for ten or fifteen minutes after the steam has been turned off and coloring added, unless the milk is over-ripe. When milk is in proper condition, add sufficient pure flavored, reliable rennet, diluted with cold water, to coagulate it fit for the knife in thirty minutes. Then cut first with the horizontal knife, commencing before the curd is hard, and moving very carefully so as not to disturb the mass. As soon as finished cutting lengthwise with the horizontal knife, cut crosswise with the perpendicular knife, and then lengthwise. The curd will then be in square pieces about the size of dice. I would much prefer having them about one-quarter smaller, for if too much whey is left in the particles of curd, the cheese will develop a nasty flavor. We are badly in need of a better class of curd knives than we have at present. They are coarse, thick-bladed, ugly things, that bruise the curd instead of cutting it. If the milk has been in proper condition, and the curd not liable to develop acid too fast, I would turn the curd with the hands very carefully, going slowly twice round the vat. Then loosen any particles that may be sticking to the sides or bottom of the pan, then turn the curd over carefully with the hands, going twice round the vat again before applying the heat. If curd is roughly handled at the start, fine glossy texture so desirable in a cheese will be destroyed, the development of acid will be much slower, and the loss in yield greater, so it pays in more ways than one to be very careful while the curd is soft. After applying the heat, stir constantly, keeping all the particles of curd separate, raise the temperature gradually, or at the rate of, say, two degrees every five minutes, until the curd is cooked, which should never be above ninety-eight degrees even on a wet day when the humidity is great, and ninety-six degrees when the air is dry and clear. If the knives were made so as to cut the curd into smaller

pieces, I believe a lower temperature than ninety-six degrees would give a richer and more creamy flavored cheese. According to my observations a cheese made from an over-cooked curd is seldom nasty, but never nice.

After the temperature has been raised to the desired degree, if the acid is developing rapidly, I would run off the whey until there is just sufficient to cover the curd, which I would stir so as to expel the whey, and get well and evenly cooked. When the curd is fairly firm, and shows 1-8 inch of acid by the hot iron test, the whey should be drawn off, the curd dipped into a sink and stirred until fairly dry. One of the finest points in cheese-making is to know just how much moisture to leave in a curd at this stage. Of course if the acid is developing fast, the curd will need to be stirred considerably drier than if it is developing slowly.

Spread the curd evenly over the racks in the sink, about five inches deep, being careful to have it the same depth at the sides and ends, as in the middle. After it has matted, cut with a thin-bladed, dull-pointed knife into strips about eight inches wide, turn over, doubling the pieces at the end of the sink. In about fifteen minutes cut through the centre and turn again, putting the outer ends in and doubling if the acid is developing slowly, but if fast, do not double. Sometimes it is necessary to pile, but every time when turning put the pieces that have been on the outside to the centre, so as to insure an even temperature. Remember that an even temperature of all the curd is important. When sufficient acid has developed which may be one inch by the hot iron test on a close sultry day, with a fast worker, to two inches on a clear, cool day, cut into pieces about five inches square, which leaves it in good shape for the Harris curd cutter, the one I have found to be the most economical, and do the best work.

I would not use any cylinder mill I have ever seen except the Macpherson, which does very good work, but the "Harris" is the handiest, best and cheapest. The Macpherson may be a little better for gassy curds. After the curd has been milled stir well so as to check the acid, and keep it in proper condition for salting. When it has developed a nice, cheesy flavor, cuts smooth and close, shows butter when squeezed in the hand, apply the salt—the best you can get.

Mr. Dillon here showed one of the beautiful gold medals given for the best cheese at the Charlottetown, P. E. Island Exhibition by the Windsor Salt Company. He also referred to the splendid medals given for the best cheese and butter exhibited at the meeting, saying every cheese and butter maker should strive to win such medals. If they do not win, the probabilities are they will make a better quality of goods than if they do not enter into the competition. The chances are the water tanks and the boilers will be cleaned, the pans taken out of the vats and cleaned, the gutters and whey tanks thoroughly scrubbed and scalded. When he was making cheese at Kennilworth, one of the patrons drank the whey which was pumped from the tank and delivered at his farm during the five years he was in charge of the factory. The pumps, platform and tank should be scrubbed and scalded thoroughly once a week, even if the tank is not an elevated one.

For a slow curing cheese three pounds of salt to the curd from 1,000 pounds of milk should be used, and for cheese to ripen faster use two and one-half pounds, putting on carefully, so as to have it evenly distributed. After the salt has been well stirred in and had time to dissolve, say about fifteen minutes, it is ready for the press.

It is not necessary to keep the making-room shut up close as many makers do, except from the time the rennet is put in until the curd is cut in the vats. The cheese will be all the better if there has been a free circulation of pure fresh air in the room during the whole process. Of course the curd should be covered with a nice clean cloth when not being stirred or turned. All cheese in a section or Province (except those made for a special market) should not only be uniform in make, but in size and finish as well. Therefore it would be well to weigh the curd into the hoops, so as to have the cheese all the same size. If the curd has been handled carefully, and has carried the correct amount of moisture, the cheese will take a nice finish if put to press at 84 degrees, will lose a smaller quantity of fat, and be less liable to puff than if put to press at a higher temperature. Press gradually at first, getting stronger and stronger, and in about 45 minutes take the cheese out, pull up the bandage so as to leave no wrinkles, and have the

seam perfectly straight. Put on the capcloths nicely, then put back in the press and apply the pressure, adding to it several times during the evening, but not too strong. All cheese should be turned in the press in the morning and left under pressure until about the time the press will be needed in the afternoon.

More attention should be given to keeping the curing-rooms at a lower temperature. It is very important to have an even temperature of about 60 degrees or even lower, and never above 70 degrees, for curing cheese. In summer the doors and windows of curing-rooms should be opened in the evening after sundown and early in the morning, and closed shortly after sunrise to keep out the heat. An ice-box which can be easily lowered to put in the ice, and raised to near the ceiling, is a very good thing to have in excessively hot weather.

If the day is cool it is well to leave the shutters and windows open on the shady side of the building. Cheese will be all the better for getting plenty of light and air, but they must be kept out of direct draughts, and the sun should not be allowed to strike them. When the weather is cool in spring or fall, provision should be made to keep the temperature up to about 70 degrees. By heating with steam from the boiler the risk from fire will be less, and a more even temperature can be had at less cost than with a stove.

The whole curing-room should be clean and in order, but the shelves need to be dusted every day when new cheese are put on them. Stencil the day of month and number of vat on the cheese when they are put on the shelves; then if you want something nice for exhibition purposes you will have no difficulty getting those belonging to the same batch as the one you try, or if a lot develops an undesirable flavor you know where they are without trying every cheese. Trying cheese injures them somewhat, and they should be tried only for information, not to satisfy curiosity.

Turn every day until three or four weeks old, when they will be fit to ship. When boxing cheese stencil the weight on the right hand side of the seam, resting the stencil on the lower band of the box and having the weight as near the seam as possible. To distinguish each month's make when boxed, place directly over the weight the figure "1" for May, "2" for June, "3" for July and so on. Put brands on neatly and distinctly, and do not blacken the box. When boxing put two scaleboards on each end of each cheese.

Weigh carefully. Remember it is always better to have the number of pounds in the box to correspond with what is marked on the outside of it. Put covers on the boxes so the double wood of the cover will be directly opposite the seam in the box, then there will be sufficient wood to hold the nails, and they will not injure the cheese. Always nail the covers unless instructed by the buyer not to do so. Of course it is understood that the cheese have been inspected by the purchaser before being boxed. It always pays to have good boxes, even if they do cost a cent or two more each than poor ones.

Allow no cheese to be drawn to the shipping place in a dirty waggon. Get men to load them on end rather than on the side. When shipping by rail see that the cars are clean. Get railway or steamship agent to count, and give you a receipt for the number of boxes shipped. Accept no receipt marked "shipper's count." When shipping cheese, send an invoice to the consignee, and send separate invoices for different months' makes. "White" and "colored" cheese also require to be invoiced separately, even if made in the same month. When you have won the confidence of the buyer, and he does not give your cheese as close an inspection as he otherwise would do, if you have any cheese that are not strictly fine, put a distinguishing mark on them, and invoice them separately. By attending to all such details, you will get the goodwill of the buyers, and they will be more anxious to deal with you, and you are sure to get better prices.

You will understand by this time that cheese-making is no lazy man's job, and that most of his time is required at the factory. While airing the curing-room in the evening, he will have some time for reading and study, which he should take advantage of. Cheese-makers, and dairymen generally, should be readers, so as to profit by the experience of others. There is not so much originality in the world as some of us are apt to think.

Take the origin of co-operative dairying for instance. If Mr. Smith's son had remained at home with his father, and not got married, the chances are that that Mr. Smith would not have had the honor of being the first to operate a co-operative cheese factory. There are plenty of excellent dairy papers available, and in order to keep up with the times one must read and, as I said before, learn from the experience of others.

"Who heeds not experience, trust him not. Tell him
The scope of one mind can but trifles achieve.
The weakest who draws from the mine will excel him,
The wealth of mankind is the wisdom they leave."

In conclusion I want to say to those who have the employing of cheese and butter-makers, that they must not only consider what they pay, but the amount they will lose if they have not a good careful manager.

I have in mind now two creameries that were operated quite close together one winter, the milk delivered at each testing practically the same. Both factories used the same kind of separators, churns, etc., yet one paid his patrons nearly 8½ cts. net per 100 lbs. of milk more than the other, or upwards of $100 per month; and mark you these were both rated as first-class men.

At a certain cheese factory in our neighborhood, during the season of 1897, the maker took 10.90 lbs. of milk to each pound of cheese, while another man in the same factory made better quality of cheese from 10.37 lbs. of milk during 1898. The factory was a large one, making about 140 tons. The saving in this way to the producers amounted to considerably more than the better man got for manufacturing. Milk is an expensive product, and the men who handle it should be very careful not to waste it in any way, and always aim to make the most of it for the producer.

ELECTION OF OFFICERS.

The report of the Nominating Committee was presented, and upon motion was adopted. The list of officers for the current year appears in the Appendix.

REPORT OF INSTRUCTOR BENSLEY.

I have much pleasure in submitting this my sixth annual report to this Association as inspector and instructor. The district allotted to me was the same as last year, viz, the counties of Addington, Lennox and Frontenac.

The names of the factories visited are as follows:

Harrowsmith
Railton No. 1
Perth Road
Duffs
Battersea
Excelsior
Sand Hill
Model
Glenburnie
Collin's Bay
Union
Glenvale
Sydenham
Forest
Arrigan
Railton No. 2
Cold Spring
Keenan's
Pine Grove
Bear Creek
Pine Hill
Sunbury
Hartington
Excelsior
Verona
Iron Junction
Sheffield
Farmer's Friend
Farmer's Choice
Wolfe Island
Ontario
Silver Spring
St. Lawrence
Gilt Edge
Morning Star
Howe Island
1000 Island
Cataraqui
Hinchinbrooke
Parham
Long Lake
Tichborne
Fish Creek
Sharbot Lake
Oso
St. George's Lake
Farmer's Friend H.
Desert Lake
Spring Valley
Oak Flats
Rose Hill
Granite Hill
Maple Leaf
Petworth
Palace Road
Centreville
Enterprise
Whitman Creek
Forest Mills
Albert
Moneymore
Maple Ridge
Tamworth
Marlbank
Selby
Deseronto
U. E. L.
Phippen No. 1
Odessa
Amherst Island

Of the 148 days in the employ of the Association 134 days were spent in inspecting milk and giving instruction, three days attending cheese boards, three days settling milk cases, and eight days travelling. Part of this time rain prevented my working.

Of the 7,500 samples of milk tested by me, 18 were found to have been tampered with; 17 persons were fined and one let go with a warning, owing to his impoverished circumstances.

The amount contributed by factory men for my services was $356, making a total of $461 to the Association.

The cheese in my section, with a few exceptions, were fairly good, considering the unfavourable season for making; for I think you will all agree with me when I say we have not had so difficult a season for making in years, owing to the excessive heat and drouth in July and August. Cheesemakers know what heat means in curing-rooms, for there is not one in twenty where you can control the temperature. I have seen the thermometer run up to 85° or 90°, and anyone who knows anything about cheese knows it is impossible to keep it in good condition at that temperature.

In conclusion, I would recommend the cheesemakers to be a little more particular regarding the quality of milk they receive, for, as I have often said, it is the only business in existence to-day where a man is expected to make a first class article from fourth or fifth class material. So as you are responsible for the results it stands you in hand to be very careful what quality of milk you receive.

G. H. Bensley.

REPORT OF INSTRUCTOR HOWEY.

In submitting this, my fourth annual report as instructor and inspector of this Association, I cannot say that I have anything new to offer.

The district allotted to me by the directors was the same as previous years—Prince Edward County and part of North, East and West Hastings, and also part of Lennox and Addington.

In accomplishing this work I spent 151 days in the employ of the Association. Of this number 137 were spent in giving instructions and testing milk, the remaining time was spent in travelling, settling milk cases and being detained by rain. During this time I visited sixty-nine factories as follows:

Weller's Bay	2	Glenn	2	Metzler	2
Moira	2	Rosebud	2	Newburgh	3
Rogers	2	Mountain	2	Croyden	1
Queen's	2	Shannonville	2	Union	1
Thurlow	2	Mountain View	2	Napanee	1
Foxboro'	3	Hyland	2	Brighton and Murray	2
Ketcheson	3	Bronk	2	Hilton	2
Front Sidney	2	Eclipse	2	Gwynne	2
Sidney Town Hall	2	Wooler	2	Allisonville	2
Springfield	2	Grove	2	Bengill	2
Quinte	2	Stoco	2	Cherry Valley	2
East Hastings	2	Moira Valley	2	Point Traverse	2
Zion	2	Rock	2	Union	2
Plainfield	2	Victoria	2	Royal Crescent	2
Reid	2	Cla nRiver	2	Royal Street	2
Melrose	2	Roblin	2	Cressy	2
Ormsby	1	Tweed	2	Cloverdale	3
Coe Hill	1	Bogart	2	Bloomfield	3
Sidney	1	Flinton	2	Northport	2
Frankford	2	Cloyne	2	Bethel	2
West Sidney	2	Boundary	2	Maple Leaf	2
Holloway	2	Thomasburg	2	Waupoose	2
Roslin	2	Camden East	2	Larkins	2

Out of this number I tested over 8,000 samples of milk with the Quevenne lactometer, and over 1,000 with the Babcock test, and found nineteen samples deteriorated. These transgressors paid fines to the amount of $320, the amount of fines netted to the Association was $160. The amount contributed by factories for my service was $343, making a total to the Association of $503.

In conclusion I would ask all cheese-makers to be more particular about the milk received, and not to sign contracts to make first-class cheese where the buildings are not fit for such purposes.

HUGH HOWEY.

REPORT OF INSTRUCTOR WARD.

I have the honor of presenting my first report as instructor for the Eastern Cheese and Butter Association for the year 1898.

The work was done in the section allotted me, namely: Madoc, Stirling, Campbellford and Brighton. I visited 88 factories, worked in 74, and made 151 tests. I took specific gravity of 7,208 samples, and tested 5,337 samples with Babcock. Of these 61 were deteriorated. Of the number of samples tested for butter fat 193 tested two per cent. and under three per cent., 4,054, three per cent. and under four per cent.; 1,030, four per cent. and under five per cent.; and thirteen, five per cent. and over. The number of visits made were 149, and calls 95. The names of the factories visited are as follows:

Alexandra,
Baltimore,
Beaver,
Bell,
Big Springs,
Brae,
Brickley,
Brighton,
Brighton and Murray,
Brook Valley,
Buelah,
Burnley,
Castleton,
Cedar Hill,
Central,
Centreton,
Champion,
Cold Springs, B. Board,
" M. Board,
Cook's,
Crow Bay,
Codrington,
Daisy,
Delora,
Eclipse,
Edville,
Enterprise,
Empire,
Evergreen,
Fleetwood,
Forest,
Foxboro',
Frankford,
Golden,
Grafton,
Halloway,
Hope,
Harold.
Hastings,
Hilton,
I.X.L.
Kingston,
Lakefield,
Madoc,
Maple Leaf,
Marble Spring,
Marmora,
Meyersburg,
Model,
Monarch,
Morganston,
Newcomb's Mills,
Norham,
North Smith,
Oak Leaf,
Percy,
Peterboro',
Pine Grove,
Plum Grove,
Prince of Wales,
Queensboro',
Riverside,
Roseneath,
Round Lake,
Rylstone,
Salem,
Seymour, West,
Shamrock,
" No. 1,
Springbrook,
Spring Creek,
" Hill,
" Valley,
Spry,
Standard,
Stanwood,
Star,
Stirling,
Trent Bridge,
Trewern.
Valley,
Victoria,
West Huntingdon,
White Lake,
Wicklow,
Woodland,
Wooler,
Young's Point,

Of the sixty-one cases of deteriorated milk, I settled thirty-two, and the balance were settled by the management of the factories.

The amount of money received to be paid into the funds of the Association is as follows: Fines, $246.17; from factories, $299; total, $545.17. The number of days spent in accomplishing this work were 157.

Cheese-makers as a rule I found competent in their trade, but would strongly recommend all makers to attend a dairy school, for where they have done so the make, put up, and finish of their goods were improved and strongly noticeable. Factory managers should look well to their part and have proper buildings, equipments, and surroundings, as I found some makers trying to do the impossible—make fine cheese where everything was against them. I would strongly recommend in every way possible to try and reach the producer of the milk, and get him to see that it is dollars and cents to him to produce and deliver his milk in the best condition possible. This I consider is one of the

most essential needs of the present day, and I believe thousands of dollars go into the whey vat every year, that should not, by milk being out of condition. The strong opposition between factories in some sections is a great source of trouble in getting proper milk delivered. I would advise all factory managers to agree on territory, and then refractory patrons would have to stay at home and do what was right. Another thing to be deplored is the returning of whey in milk cans, which I believe leads to trouble in the cheese. To sum up, do not expect impossibilities of makers, have first-class milk, a proper place to manufacture, proper utensils to handle it with and right curing rooms for the cheese after it is made. Then if your maker does not do his part let him go and get another that will, as soon as possible.

I wish here to thank the factory managers and makers for the kind way they received me and assisted in the work, and also the committee I worked under for their valuable counsel and aid.

All of which is respectfully submitted.

R. W. Ward.

REPORT OF INSTRUCTOR PURVIS.

I take pleasure in submitting this, my sixth annual report of work done by me as your instructor. The work having been carried along the same lines as in former years there is not much new to bring before your notice.

Of the 177 days spent in your service, 158 were used in giving instructions to makers and testing milk, 11 in travelling, 4 detained on account of rain, 3 attending Court and 1 at Cornwall Cheese Board.

The amount contributed by factorymen for my services was $618, and the amount of fines collected by me amounted to $150.

I may say, that I found fewer cases of tampering with milk than in former years, and nearly all of these were small patrons sending small amounts of milk. In one stock factory I detected one of the directors sending skimmed milk, and had him brought before a magistrate where he was fined $20.

Twenty-five others were dealt with as follows:—Four were taken before the same magistrate and fined, three of them $5 each and one $10; twelve settled with me, and the rest settled with the managers of the factories to which the milk was sent.

The following is a list of the factories visited and the number of visits paid:—

Fournier	4	Siloam	1	Dominionville	3
Finch	3	Echo	3	Springdale	1
Sunshine	2	Farmer's Joy	3	McMillan's Cor	3
McLean No. 1	3	Lodi	4	Sunrise	2
Alexandria	2	Rose & Co	5	Chesterville	1
St. Isidore	3	Pendleton	5	Cobb's Lake	5
Springbrook	5	Boundary A.	5	River Valley	1
Kirk Hill, No. 2	1	Kirk Hill, No. 3	1	Kirk Hill, No. 4	1
Kirk Hill, No. 5	1	Kirk Hill, No. 6	1	Kirk Hill, No. 8	1
Kirk Hill, No. 9	1	Lorne	3	Pleasant Valley	3
Battle Hill	3	Aberdeen, No. 1	4	Nation Valley	1
Circle 3	2	Circle 10	1	Circle 11	3
Circle 51	1	Strathmore	1	Cornwall Centre	1
O.K.	1	North Valley	2	Aberdeen A	1
Green Bank	1	The Brook, No. 1	1	The Brook, No. 3	1
B. B. 1	1	B. B. 3	1	B. B. 5	1
B. B. 6	1	Mayerville	1	Riverside	1
Gilt Edge	1	Green Wood	1	Pine Grove	3
Lancaster	1	Glengarry	1	Victoria	1
Maple Creek	3	Curran	1	Gratton, No. 1	1
Gratton, No. 5	1	George's Lake	1	Wymans	1
Ash Grove	1	Empire B.	1	Skye	3
Fair View	1	Star, No 1	1	Ottawa Valley	1
G. 230	1	St. Amour	2	Brookdale	1
Cedar Grove	1	Dornie	3	Balmoral	1
Maple Leaf	3	Therriens	1	Maxville	
Lunenburg	1	Farran's Point	3	Croil	3
Goldfield 1	1	Crysler	2	Ste. Anne	3

I found quite an improvement in the quality of the cheese made as a whole, but until the factory owners fit up the buildings, especially curing-rooms, better there is going to be fault found with cheese. The makers as a class are doing about all that could be asked of them, and appear anxious to excel, and if their efforts were backed up by the owners and patrons there would be far less trouble. The chief trouble with the makers I found was that they were inclined to use two much starter, and also to keep curds too warm after draining; but I found less of either of these faults last season than ever before, and think there will be still less in future.

A number of factorymen in this district have adopted the plan of saving samples every morning, and testing once or twice a month, but continue paying the old way (pooling). The makers, as a rule, take in milk that is unfit for cheese making, and more than once during the season I have advised the maker to reject such milk, and been told that if he refused to take it he would lose that patron and they could not afford that. In one instance I went to the patrons house and found that he kept the milk over night on a platform within ten feet of the pig-pen on one side and the manure pile less than twenty feet away on the other side, and as he had over thirty cows milking, and sent about 650 pounds of milk per day it poisoned the whole vat. I explained the matter to the patron, and he promised to move his milk stand, and there was no more trouble there. I think if the makers were to go to the patrons' farms and explain what was wanted there would be far less trouble from bad flavored milk.

A. P. Purvis.

Mr. James Whitton: We had trouble with a joint stock' factory, and that is the hardest kind of factory to deal with, for many farmers do not like to see $40 or $50 spent in putting a good drain into a factory. The drainage had been soaking into that establishment for thirty or forty years. The cheesemaker was a man who had been successful at several factories. Good drainage in a cheese factory pays over and over again. I am glad we have men like Dr. Connell who can trace these evils to their source. It will help to give the maker a fair show, improve the quality of the cheese, and in that way also help the patron in the end.

The President: The small factories should unite and have larger and better buildings put up which could take in milk every day in the year. Cheese cannot exist in an impure atmosphere. No man could be healthy in such an atmosphere as has been complained of to-day. Of course, most of our factories are getting into better shape.

Mr. Aderhold: I would like to know if that maker exhibited good common sense when he undertook to make cheese in such a place and under those conditions?

Mr. Whitton: We have a great many cheesemakers, and they are all anxious for a job. He visited the cheese factory and thought he could make a fair article in it, until someone brought them up as to the quality of the cheese. In the spring of the year he did well, but as soon as the hot weather came it struck him in a way he did not expect. He got into his summer work before he discovered the true condition of the factory, and found out just where he was. He could not afford to back out then and the company decided to proceed against him. He did not at first know the condition of the factory, and went there in good faith.

REPORT OF INSTRUCTOR ZUFELT.

I have the honor of handing you my second report as Instructor for the Cheese and Butter Association of Eastern Ontario. The quality of the cheese made this season was if anything finer than the previous one, with perhaps the exception of the flavor in a few localities. This is a very serious matter, and one which requires very close attention.

So far as I was able to judge, the maker was not altogether to blame, and while I do not wish to relieve him of all responsibility, still I think he is made to shoulder a great deal which properly belongs to some one else. In the majority of cases the bad flavors are produced on the farm, either from bad food, bad water or more often by negligence or want of knowledge in taking proper care of the milk. It is surprising to see the places in which some people keep the milk, and then they will say the maker is too particular, or that he wants to find fault, and does not know what he wants. If we wish to make any improvement in our cheese it has to begin at the beginning on the farm. We must have a better quality of raw material before we can produce a finer quality of cheese. We must have the milk delivered at the factories pure, clean, sweet, and without any bad flavors; then if the maker does not do his duty we know who to blame.

Another error I noticed this season was that a large number of makers were making their cheese too soft. There is a difference between a meaty cheese well cured, and a soft cheese which soon goes off flavor. My advice to the makers would be to make the cheese firm without being harsh, and keep them in the factory until they are properly cured before shipping. I know of cases last season where the cheese were shipped out to within three and four days of the press. The bad effects of this practice is quite apparent.

One other matter I should like to mention is that the inspector cannot under present conditions get to the factories often enough. At the most he visits the factories only three times, one of these being only a call, and the most of the time is largely spent in testing the milk and in driving in many cases twenty-five and fifty miles to the next factory. Of course this is no doubt quite important, but do the maker and dairymen receive the benefit they should if the inspector spent the whole day with them, and instead of trying to convict some parties for watering and skimming he would direct his energies to find out who was sending milk of bad flavor and try and get the farmers to make an improvement in their product? In my opinion this is a question well worthy of consideration, as the whole secret of a maker's success is largely due to his ability in getting the milk delivered in a wholesome condition.

In the matter of adulterations this season I found a remarkable falling off from the previous one. Whether this was due to inability on my part in detecting them, or whether the people have seen the error of their ways, I cannot say, but am inclined to think they have seen it no longer pays to be dishonest, and have concluded to send the milk as they receive it from the cow. Out of some four thousand odd samples of milk tested this season only five were found to be adulterated. Of these, two were let off by request of the managers, the other three paid fines of $40, $25, and $10 respectively.

The following is a list of factories visited with number of visits paid to each:—

Campbell's	2	Sharkey's	3	Maple Ridge	3
White Globe No. 1	9	Hallville	3	Kendrick & Carlyle	1
" No. 2	1	Farmers'	3	Lorraine	3
" No. 3	3	Metcalfe	3	Osgoode Centre	1
" No. 4	9	North Osgoode	3	Green Valley	1
Berwick	3	Greely	3	Gananoque Jc	2
Bowman No. 13	3	Coldsprings	2	Central	2
Tidbits No. 1	9	Maple Grove	3	Junetown	1
" No. 2	3	Brinston's Corners	3	Advance No. 4	1
" No. 3	3	Osgoode No. 3	1	Eamer's Corners	1
Simser's	3	Reid's Mills	2	Hyndman's	1
Bouck's Hill	3	Malakoff	2	McCalpin's	1
Shanley	3	E. W. No. 20	1	Fairfax	1
Coldbrook	3	" No. 21	1	Summers'	1
Lansdowne	1	" No. 17	1	Allan's	1
Rapid Valley	1	" No. 26	1	Morewood Union	1
Morton	3	" No. 11	1		
South Lake Model	3	" No. 23	1	Total	126
Young Mills	1	West Osgoode	1		

The number of days spent at factories was 122; attending fairs as judge etc, 7; lost on account of rain, 8; spent driving 15; total 152 days.

The amount of money received was: fees from factories, $425.50; half fines ($75), $37.50; total, $463.

Mr. Zufelt added the following remarks: It is no doubt a little disappointment to the directors of the Association that we have this year received so little in the way of fines to help to pay our expenses, and I hardly know whether to feel sorry or glad that my report is of this character. I would like to have got more money, yet I am pleased after all that I did not get much in the way of fines, for this shows that the people have found that they cannot put water in their milk, or otherwise tamper with it, without being found out, and having to pay the penalty. It also shows that this doubtful source of revenue cannot be depended upon, and the Government will have to come to the assistance of the Dairymen's Associations and give them more aid. (Applause.) The work of your inspectors will soon be what it always should have been—instructing, and not prosecuting. (Applause.) There are more factories in the section than the 54 I visited. These are all that applied for visits.

REPORT OF INSTRUCTOR PUBLOW.

I herewith submit my report of work done as one of your instructors and inspectors for the season of 1898.

I commenced work on April 29th and ended November 7th, making in all 165 days in the employ of the Association. Of this time 125 days were spent in factories, testing milk and giving instructions in cheese-making, 12 days in travelling, 8 days attending to milk cases, 5 days attending cheese boards, 3 days acting as judge on cheese at exhibitions, 4 days inspecting cheese in Montreal, and 8 days detained on account of rain.

The number of factories visited was 91, and they received 143 visits, as follows:

Franktown	1	Lyndhurst	2	Riverside	3
Independent	1	Chantry	1	Fermoy	2
Ash'on	1	Reliable	1	Bedford Mills	2
Daisy	1	Hopetown	2	Lombardy	2
Maple Leaf	1	Elphin	2	Clear Lake	1
Robinson's	1	Clairview	2	Gilt Edge	3
Clayton	1	Carsonby	2	Athens	1
Stanleyville	3	Carp	1	Delta	3
Westport	2	Gold Medal	1	Clyde	1
Ontario	2	Mississippi Pride	1	Watson's Corners	2
Clear Spring	2	Pakenham	3	Park Hill	2
Rock Dale	1	Balderson's	1	Taybanks	1
Leo Lake	1	Mississippi	3	Bell's Corners	1
Frankville	2	Mountain View	2	Appleton	1
Plum Hollow	1	Centreville	2	Union Pride	1
Middleville	2	Elm Grove	2	Crosby	1
Dalhousie Lake	3	Elgin Model	2	Pine Grove	1
Maberly	1	Cold Glen	2	North Line	1
Prospect	1	Oak Leaf	1	S. L. W	1
Hazeldean	1	Harlem	1	Salem	2
Woodlawn	1	Philipsville	1	Model	1
Rosdale	1	Poland	2	Portland	1
Maple Valley	1	Brookside	2	Maple Grove	1
Fallbrooke	1	Tayside	1	Seeley's Bay	1
Ardoch	1	Twin Elm	2	Addison	1
Ardmore	3	Ottawa Valley	1	Soperton	3
Mapleton	2	Kinburn	2	Lanark	1
North Shore	2	Rose Bank	1	Zealand	2
Myers	1	Mud Creek	1	Bathurst Mutual	3
Springvale	3	Harper's	1		

Of the 6,341 samples tested, 43 were found to have been tampered with, and 39 of these were fined $800. Of this amount, the factories in which the fines were imposed received $400. The amount net the Association from this source, after deducting $55 for solicitors' fees, is $345. The amount contributed by factorymen to the Association for my services is $445, which, with the amount from fines, $345, makes a total to the Association of $790.

I am pleased to say that I found a marked improvement in the condition of the factory buildings. Some of the old ones have been remodelled; some have been torn down and replaced by new and up to-date buildings; and I would say that there is still great need of improvement along this line.

I am also pleased to report a marked improvement in the style and finish of the cheese in some parts of the section; but there are still some cheesemakers who are very careless in this respect, and also in the condition of their factories and utensils. I would say that I am not in sympathy with a maker of this stamp.

The principle faults found with cheese this season were bad flavor and looseness in the make. I would say that I never had as many letters as I had this season, from makers complaining of the difficulty they were having in this respect, and I might say that I had a great many more applications for inspection than I was able to accept, as there are about 250 factories in the district allotted to me. The cause of the trouble in the factories, having open and off-flavored cheese, that were visited by me, was invariably due to the condition of the milk. The plan adopted (to locate the taints) was to make a fermentation test of all the samples of milk delivered, and after consulting the test it was surprising to see how many developed pinholes and a bad flavor; but after driving along the road and visiting some of the patrons, and seeing the way the milk was being cared for, the wonder was that the cheese turned out as good as they were.

It is astonishing why patrons will still persist in leaving their milk on wagons backed up to the cow byre doors over night, in barnyards, on stands beside swill barrels, and milk with wet hands, and not even take the trouble to strain it, and then expect a cheesemaker to make a first-class, fine flavored cheese from it. In the factories that I visited that were having the most trouble with their cheese, some of the patrons were found to be caring for their milk in the above manner.

I also found some cheese weak in body, with a harsh texture and an acid flavor, and a large percentage of the cheese rejected in Montreal that I was called upon to inspect were of this character. This was due to improper methods in the manufacture.

In conclusion I take this opportunity of thanking all parties with whom I came in contact in the performance of duty for their kindness and courtesy towards me. I have confined this report to the work actually done, but I shall be pleased to give any further information if required.

G. G. Publow.

Mr. Gibson: What effect will the feeding of turnips have upon cheese?

Mr. Publow: You cannot completely take the flavor of turnips out of cheese. Do not feed them. In sections where milk is produced those who insist upon feeding roots to cows should give them mangels. It is said by some that you can feed a small quantity of turnips safely to milking cows. It can be done, but it is a dangerous practice in any event. If it be dangerous, then my advice is "keep away from the danger." Prevention is better than cure.

Mr. Gibson: We have found that some farmers are not content with feeding turnip roots, but also give the tops to their cows.

Mr. Macpherson: I may say for the information of those present that they have had a case in court in my district where one patron insisted upon feeding turnips, and thus reduced the value of the cheese. He was sued, and had to pay the loss. It was decided that if a patron gave his cows anything that affected the flavor of the milk and so injured the quality of the cheese he should pay for the loss.

The President: It has been said that Scotchmen and turnips grow up together, and that it is hard to separate them. The turnip is a good thing to fatten an animal with, but when you want to make fancy butter or cheese do not feed turnips, either top or root, or allow turnips near where your cattle or milk are kept. Turnips will injure milk, whether for city delivery as milk or cream, or as cheese or butter.

Mr. Zufelt: An instance of feeding sour ensilage when the grass was short last summer came under my observation. I would like to know if the feeding of this sour ensilage would have any effect upon the flavor or quality of the milk?

Mr. Macpherson: I have not had much experience in feeding ensilage in summer, but some of our patrons do feed ensilage at that time of year, and we have had no trouble from the custom. I think the milk from ensilage will sour more rapidly in summer than

that from grass or hay, but ordinarily no ill effect will arise from feeding ensilage in summer, if it is not mildewed; but if the ensilage is mildewed it will impart a mildewed flavor to the milk. I believe that good, clean, bright ensilage is good feed for a milking cow winter or summer, the only point against it being that the milk will not keep as long as milk from dry feed.

The PRESIDENT: I would like to say in addition that in the growing of the corn we ought to be very particular to properly enrich the soil so as to enable the crop to come to maturity in the ninety days it should ripen in. Well manured ground will give it a good start, and an early start is an important factor in maturing corn. Much of this sour ensilage—in fact nearly all of it—is made from corn that has been improperly grown and handled. The corn should come to the glazing stage before it is cut and put into the silo. I believe that ensilage is one of the most important cattle foods raised on the farms of Canada to-day. It will certainly enable the user to cheapen the production of milk, and that is a great point in our business.

REPORT OF INSTRUCTOR KERR.

I take pleasure in presenting to you my second annual report as instructor for the Cheese and Butter Association of Eastern Ontario.

The district allotted to me was the same as last year, comprising the factories selling on Peterborough and Lindsay cheese boards.

I commenced my duties for the Association on May 3rd and finished on the 6th of November.

Altogether I spent one hundred and sixty-one days in the employ of the Association, as follows: One hundred and thirty-nine giving instructions and testing milk, four attending cheese boards, six detained on account of rain, seven at milk cases, and five travelling.

The following are the names of the factories visited:

Ormonde,
Westwood,
Melrose Abbey,
Norwood,
Daisy D,
Oakdale,
Warsaw,
Warminister,
North Dummer,
Maple Leaf,
Lakefield,
Pine Grove,
Young's Point,
North Smith,
Trewern,
Lakeview,
Central Smith,
Missing Link,
Peterborough,
Shearer,
Lang.
Keene,
Bensfort,
Otonabee Union,
Cavanville,
Fraserville,
Ballyduff,
Perrytown,
Hope,
Kendall,
Orono,
Blackstock,
Darlington Union,
Fleetwood,
Myrtle,
Mount Pleasant,
Cedardale,
Stoney Lake,
Indian River,
Janetville,
Reaboro,
Omemee.
Maple Leaf L,
Dunsford,
Star,
Bobcaygeon,
Red Rock,
Fenelon Falls,
North Verulam,
Cameron,
Cambray,
Valentia,
Pine Grove,
North Ops,
Manchester,
Little Britain,
Leaskdale,
Minden,
Palestine,
Lorneville,
Mariposa,
Sutton,
Hampton.

The amount of money contributed by the factorymen of the above sixty-three factories and paid into the funds of the Association was $350.25, and half the fines collected, after deducting the costs, was $112.75, making a total of $463. The amount of fines is much less than last year. It is a pleasure to know that the world is growing better. Last year on the same grounds I had over forty cases of adulteration of milk, and this year I am pleased to report a decrease in the number to fifteen. In thirteen of this number convictions were made; and on account of lack of time two are not yet settled.

Of the 7,800 samples of milk tested with the Quevenne lactometer, and 4,075 with the Babcock tester, I found a wide variation in the value of these samples, but not so much difference as last year, especially where convictions were made.

I was pleased to find a few more factories had adopted the Babcock system in paying for milk. This system seems to induce the patrons to take better care of their milk and the care of milk largely influences the reputation of their factory.

Another great failing with the patrons in this section is they do not arrive at the factory with their milk early enough. Some, I am sorry to say, are as late as ten o'clock in the hot summer's day. I tried to impress this fact last year in Lindsay; but not as much notice is taken to this part of the work as there should be.

During the extreme hot spell in July and part of August, the makers received a good deal of bad flavored and over ripe milk, and consequently a number of poor cheese were made, which I contend was not altogether the fault of the cheesemaker, and at the same time I do not wish to remove all responsibility from the maker for he is often to blame for taking in milk which he should reject. If he would give the patrons to understand that nothing but pure, sweet and good flavored milk would be received, it would not be long until he would have no further trouble in this respect.

In the condition of the factories, as regards cleanliness and surrounding, I am pleased to report a decided improvement in a majority of them. Still there are a few yet, I am sorry to say, unsuitable for the manufacture of cheese. A great deal more might be said along this line, but as time is limited I think it is best to condense these reports as much as possible in the hope that more valuable points will be brought out by others or by means of discussion.

J. A. Kerr.

A Member: Why does that person bring his milk as late as ten o'clock in the morning?

Mr. Kerr: In some districts, especially in Victoria county, the factories are further apart than they are in this section of the Province. Some of them have a twelve mile drive with their milk. There is something wrong in the management of some of these factories in my district. I can start from Peterborough and drive fifteen miles and get to a certain factory before any milk is in.

The President: These are local conditions and perhaps we should not spend too much time criticising them. However, the fault is general enough to warrant us in saying that the man who would get the best results from the milk sent to a cheese factory must see that the haulers get up early enough in the morning to have the milk in good time and in good condition, and ten o'clock is not good time, and milk brought in then cannot be in the best condition.

Mr. Aderhold: Coming as I do from Wisconsin, it is a pleasure to mingle with Canadian dairymen, and find that you also are interested and progressive in dairying. I find here a lot of intelligent and earnest men who are working with a purpose. I heard of you before, however, and expected to find such a state of affairs. Your system of dairy instruction has often been held up to us in Wisconsin, and we have often wished that we had such a system, and have longed to get government appropriations to enable us to provide a sufficient number of instructors, as in your case. Your troubles as dairymen are often identical with ours; you run across similar obstacles to those that meet us. To take a proper part in this industry needs a good deal of education. The business needs an army of educators, which must be furnished by the Dairy Associations and through the instrumentality of the Dairy Schools. The patrons must be educated to a higher standard. In Wisconsin another feature has been added to the already arduous duties of the cheese instructors. They have to hold meetings in the various factories as far as possible, and instruct the patrons and all concerned upon the various matters that go to make up successful dairying. I have had to do this of late, and I have found after all, that it is not so disagreeable. Although I have had to come down heavily sometimes upon both the cheesemakers and the patrons I have never yet had anyone get mad with me. The first step in making improvement is to find out our mistakes; then having found them, correct them. We cannot get along without the patrons, and the patrons cannot get along without our help. Let our mistakes be mutually explained and corrected. This Convention and the banquet have been among the most pleasant experiences of my life. I desire to thank you again for the good time I have enjoyed owing to your hospitality and kindness. (Applause.)

A FORWARD MOVEMENT IN AGRICULTURE.

By Hon. Sydney Fisher, Minister of Agriculture, Ottawa.

Your discussions have been so practical and helpful that it seems like an interruption for me to rise to address you, although cordially invited to do so. However, I am, and have been for many years, a practical farmer and dairyman, especially in the line of butter-making, which has been my favorite branch of agriculture. But for a number of years back my attention has been also given to politics, which is perhaps rather inferior in character to dairying. (Laughter.) And for this reason I fear I have been losing much of my ability to discuss the question in as practical way as I would like. In administering the agricultural affairs of the country as head of my Department, I find that I must deal with the questions coming before me in a general way—giving due attention and consideration to every branch or line of agricultural work—and dealing not only with the principles of raising or making of farm produce, but also with the selling of these products. I must study not only the affairs of the maker in the local factory, but the principles underlying the handling of the products after they leave the hands of the manufacturer. The later stage of the business is just as important as the earlier or producing stage; we should endeavor to have no break in the chain linking the first producer to the consumer. If we never had the instruction that Prof. Robertson and your inspectors and dairy instructors are giving us, we would not have reached the high position we have attained as producers of excellent dairy goods. We would have been simply able to feed ourselves, and to have done so in such a way that we would not have been the splendid men and women that Canadians are. But by reason of the fact that we have been pointing in the direction of excellence of quality as well as of range of quantity, we have made for ourselves a reputation in the markets of the world. I speak of excellence, because I wish to emphasize the fact, that today the export trade of Canada can only increase in quantity by maintaining and raising the excellence of the products As I pointed out in my previous address, we cannot expect to be able to send much more cheese into Great Britain than we do now, as we already furnish that market with about two-thirds of its cheese importation. I would go further, and say that if we are to hold our own there we can do it only by maintaining the quality of our cheese; in fact, with the keen competition of to-day we shall have to improve the quality, for over there they buy their cheese and other articles of food solely on account of their excellence. If the market is not fully supplied the English people may possibly take dairy produce not of the very best quality; but when the market is full or glutted only the primest quality of food will be purchased, and that is where the excellence of an article tells. In the visit that I paid to England last summer I found some criticism as to the quality of some of our Canadian cheese. That was a new thing to me. I felt in my own mind that there was not much more reason for criticism than in former years, but in that market now the supply is equal to the demand, and therefore it is necessary that the makers of Canada should give more attention to the quality of the make. Indeed, too close attention to the details of manufacture cannot be given if we are to maintain our present lead in that great market.

With regard to our butter-making, we are on the upward grade. Over and over again I have had some of the largest dealers in the British markets say to me: "Your Canadian butter is increasing in quality; it is superior to the Australian; it is almost, if not fully, up to the best Danish." This is a high tribute to pay to our Canadian butter. Now, Canadian butter was made just about as well five years ago as it is to day, but there was not so much of it made well—there was not as much uniformity in the make and style of packing as there is now. And since then we have established a system of transportation by which we can get our butter to Great Britain in just about as good condition as it leaves the creamery. It takes about three weeks from the time of making until it reaches the table of the English consumer, but practically it is only about half a day from the consumer. We have been able to accomplish this by a chain of cold storage, by which our butter goes into a cold temperature as soon as made, and it is maintained at almost

the same temperature until it goes on the counter of the British retail dealer. This being the case, our butter has gained a better reputation than ever before upon the old country market. We have sent first-class butter to England from the North-west Territories. Last year we sent a shipment of butter to England which was made in Alberta, and not one iota of change occurred in the quality of that butter from the time it started from the distant North-west until it was placed on the table of the eater in England. (Applause.) We have an almost unlimited scope for increase in our butter trade in the English market. At present we send to England only about ten per cent. of the butter she imports, while we supply her with 60 to 70 per cent. of the cheese she imports. This will show you at a glance that we must turn the direction of the increased production of milk to butter rather than to cheese. I do not ask you to divert any of your milk from the cheese vat to the creamery ; but I do say that the increased flow of milk must for the future be given to butter and not to cheese.

At the same time that our butter is attaining to a higher position in the British market, we find also that our bacon is coming greatly into favor. Dealers over there have been telling us that if we can continue to send bacon of the quality now being imported from Canada there is an almost unlimited market over there for it. All we have to do is to keep up the quality, and the market is ours for all we can send them. Two years ago we sent about $4,000,000 worth of bacon to England. Last year we sent $8,000,000 worth, and within another three years we mean to double that $8,000,000. (Applause.) Skim-milk is one of the best foods for a young pig, and bacon is really an adjunct of the dairy. A little meal added to skim milk will help you to turn out prime bacon at a good profit. Bacon made in that manner will give you a profit equal to 25 per cent. of a gain on your investment. That may seem to be a startling proposition to some, but I can assure you that it is a perfectly sound one. You can feed a young hog so that when six months old it will give you a carcase of 200 pounds, and that will give you a good profit.

Let me say a word here in reference to one or two things connected with my own Department. As I said last night at the banquet, the Parliament of Canada is generous to the farmers. It has placed at my disposal men and money to assist you in the development of agriculture. Last year $75,000 was voted for the work of experimental farms. This is a large sum, but I did not hesitate to tell Parliament then that if I found this was not sufficient for the work I would insist upon getting a larger grant on the next occasion, and the House by its generous applause led me to think that I would have its full support in this respect. In the matter of grants for cold storage, quarantine, etc., Parliament was equally ready to support my request, and give hearty assistance. I believe that there is an abundance of work in the interests of agriculture which the Department of Agriculture at Ottawa could do and should do, and it is my earnest desire to endeavor to find out just what these things are, and having discovered them to turn our energies in that direction, and ask Parliament to give us all needed money to help to bring the best results to pass. (Applause.) There used to be an impression in this country that because the Guelph Agricultural College could not show a cash balance to its credit it was therefore not doing enough for the money spent in maintaining it. But do you expect a high school to pay you a profit? The profit is the mental discipline and the increased knowledge and fitness for life-work that the young men who go there get, and also in the valuable information being distributed from that institution to the people of the Province at large through the able reports and bulletins written by members of the staff. These experimental farms find out things for us that we as individual farmers could not afford to investigate for ourselves on our own farms. They are doing grand work for you, and work that you personally could not afford to do. The intelligent and progressive farmers of the land are reading these reports with much profit, for they are full of valuable suggestions. I find that throughout the Dominion much interest is being taken in farming experiments by farmers. We are receiving thousands of letters of enquiry every year from practical agriculturists. Our Department has sent out as many as 50,000 bulletins at a time, and we are ready to send out 100,000 if you ask for them. They are brought to your own door for nothing. Use them wisely ; read them carefully, or the money will be wasted. Looking at this audience, I do not think there is a man here who

will sneer at "scientific farming." Men in the new settlements used to laugh at "book-farming," but that was simply boasting of their own ignorance, and their determination to remain in ignorance Now, what does "science" mean? The word simply means knowledge. Therefore scientific farming is carrying on agriculture with knowledge. (Applause.) The good farmer to-day does not sneer at agricultural science. The man who never reads a book or a Government report or pamphlet must confine himself to his own experience, or that of his intimate neighbors. But the best experience of any one man is only a drop in the bucket when you come to compare it with the experience of the whole community. By studying these bulletins and reports you obtain in the most available form the combined experience of the whole community—the experience of not one section or country, but of many. Therefore I ask you to find out what our experimental farms are doing, and, if you possibly can, visit one or more of these farms. Send for their reports and bulletins, and they will be forwarded to you without cost; then read them and put into practice what you read. We have still a great deal of work to do as a Department, and I am ready to take suggestions from whatever quarter, and to aid in the development of agriculture throughout the Dominion.

It was my good fortune last year to visit England and France, and to inspect some of the experimental farms of those countries, or, as they are there called, demonstration stations. These are small farms where the practical side of the teaching of its various Agricultural Colleges are carried on, the experiments being conducted for the more immediate benefit of the farmers of the neighborhood. I think that something of this sort can be tried in Canada. If it can be worked out successfully in its details, I propose to ask Parliament to assist me with a grant for that purpose. (Applause.) These demonstration stations appear to be very successful, especially in France. I was told when over there that the recent progress in agriculture was largely due to the effect these illustrations of good work had upon the community in which they were placed. If successful there, they may also be successful in this country. The plan is certainly worth a trial, and I hope by this means to aid in the spread of useful information of a practical nature among the farmers of Canada. (Applause.) I wish once more to congratulate you upon the success of this Association. You have a great many advantages here in Eastern Ontario. You are an educated community, with opportunities for intelligent study right in your midst. You have won an enviable reputation for industry and progress. You have had several years' experience in advanced methods of dairying, and in connection with your calling you have established the best form of co-operative work. The cheese factory and creamery is usually a centre of co-operation in agriculture that speaks well for the mutual confidence and honor of the farmers of this land. These annual gatherings do much to disseminate fresh and useful information. I am pleased to see that this Convention has been so well attended, and to know that the addresses have been so able and timely. Let me once more assure you that it gives me the greatest pleasure to meet with such practical men from time to time, to take counsel and instruction from you in things pertaining to our common calling. (Applause.)

A FEW HINTS ABOUT SELF-IMPROVEMENT.

By Dr. J. Mills, President Ontario Agricultural College, Guelph

After stating that he came bearing greetings from the Guelph Agricultural College and making a pleasant reference to the well known enthusiam and energy of President Derbyshire, the speaker proceeded to say: I am glad to be in Kingston, because nearly everyone in this part of the Province is more or less interested in dairying. I feel that in this gathering I am in the midst of dairy experts. I am sorry that I was unable to be here to listen to the practical addresses you had yesterday. I have attended a good many conventions; and the one thing that has impressed me more than any other is, that I have heard the same things over and over again. But I am reminded that educa-

tion is a slow process, and after many years' experience in teaching I am clearly of opinion that the secret of success, whether in the school or in the convention, is constant repetition of the fundamental principles that you wish to impress upon the minds of the people. You have to keep at it, and state over and over again the same thing in these conventions, in order that the subjects may be impressed upon the minds of both young and old. I am in favor of conventions of this kind, because they are important factors in the industrial education of the people. Ontario has done well in the matter of general education. I do not think that we need aim at anything very much in advance of what we are now doing in the way of general education. Our public school and high school systems are good; so also is our university system. But we are still far, far behind in the matter of industrial education. General education is good, but we need special training as well. When we come into competition with our friends on the other side of the line, we generally hold our own, and sometimes more than our own; and when we fail, it is usually in those lines in which we have not had the advantage of special industrial training. With further advantages from these special lines of education, we will make further progress. Our natural resources are a fixed quantity. Our soil, our climate, and our water supplies are practically the same as they have always been. We cannot change them; but we can and must increase the facilities for the industrial training of our people.

So far as the Province of Ontario is concerned, it has already done very well in the way of providing means for special education in dairying. Three dairy schools are sufficient for the Province; but very little has been done on other lines. We need through out this country an intelligent and thorough study of domestic economy. (Applause.) We want our girls to learn what you are learning, and more. We want them to learn about cooking, and knitting and darning, and other things that have to do with the comfort of home. Most of us, rich and poor, are educating our daughters as if they were going to be ladies of leisure from the day they leave school. They learn history and literature, Euclid and algebra; but in the ten or twelve years of their school life they are not taught a single thing that would assist one of them in mending a stocking, making a shirt, working a button hole, or cooking a meal. (Applause). This is true, not only of the wealthy, but of those who have to do their own work from the day of their marriage; and it often means a great deal of discomfort and misery to wife, husband and children.

We must admit that our daughters are not trained. And why should we not see that they are trained for their life work? But someone may say; "You surely do not mean to say that a *man* could teach darning and sewing to the girls at school." Why not? Do not tailors make the best sewers? (Laughter and applause). Of course men can learn and teach these things. Provide your daughters with such an education in a properly equipped school, and you will not find their literary education interfered with anymore than we do in the case of students at the College who take instruction in dairying and other work of a more or less manual nature along with their literary work.

The Government has provided excellent schools for teaching the young men of the Province the theory and practice of dairying, and I think that all makers should take a course in one of these schools. I do not believe that any maker has got on so far that he cannot learn from others. I was brought up on a farm, and stayed on it until I was twenty-one years of age, when I met with an accident that resulted in the loss of an arm; and I can say that I never yet visited a farm where I could not learn something. He must be a very ignorant man from whom you cannot learn something. It is a good thing to visit these dairy schools, if only to show that you are in advance of those who are there.

Take time for education. Some men are in a great hurry, and think that two or three weeks is sufficient to learn all that is worth knowing about dairying. But some who have been making cheese or butter for twenty years think that three months is not too long to spend at the dairy school, and even they confess that they have something yet to learn. It is not the ignorant, inexperienced men who are filling our dairy schools. Those who know it all in any walk of life will never know much.

Young men who are engaged in cheese and butter making should endeavor to improve their English. You cannot rise high in any walk of life if you do not use good English. It is not necessary to go to a college or high school, in order to learn how to write good English. Any one who cares to do so can learn to put words and phrases together in such a way as to be able to speak and write clear, correct, and forcible English. Do not spend your time sleeping in the chimney corner, but go to work to learn to read and write well, and to spell correctly. I went to an Indian school near Brantford some time since, and found everyone of those 100 boys and girls able to write a neat and beautiful hand. Is it because they are better artists than the whites? No, but because of downright negligence on the part of the latter. If we had to write Chinese, with its hundreds of characters, we might have some excuse for bad writing, but we have only twenty-six letters in the English alphabet. When I was a young man I learned a bad style of English, from association with illiterate men and boys; and I afterwards found that it was going to be a great drawback to me, that I would have to unlearn a great deal of it and acquire better English, or give up the idea of ever filling any prominent position. I got a spelling-book, and patiently set to work to master every word that I was not sure of, and a grammar to learn the laws of the language—half a dozen grammars before I was done. Learn to spell, speak and write correctly.

Be clean and look clean. There are some men who may be clean, but they always look dirty. There is something about their hair, or beard, or skin, or clothes that gives them a dirty appearance. When we sent out Travelling Dairy instructors, the Minister of Agriculture told me to insist on the men looking clean. Dairy men should have clean hands, clean nails, clean teeth, and be clean-shaven. We have no room for tobacco chewers or smokers among those who handle butter. If your teeth are discolored from any cause get a tooth brush and go to work.

Be orderly. I have been observing things for a long time, and I have come to the conclusion that order is the twin sister of cleanliness, while disorder is the twin sister of dirt or filth. Why does your instructor insist that this tin shall be put here, and that one put there, and not in any other place? It is to impress on you the importance of order and system in work. Have a place for every article, and insist upon every article being in its place, with a view to impress upon the boys the benefit of order and neatness. Beware of disorder in the engine room or the factory.

To the young men present I would say: Do not work according to the salary you are getting. If you go into a factory at only half pay, do the best you can. People will soon learn your worth, and you will be appreciated in time. If you get only $200 a year, do the work as well as you can, just as if you were getting $400. To patrons and owners I would say, look around and get a good maker, even if you have to pay him an extra $100. He will likely make you an extra $300. This country has but little room for commonplace makers, and none at all for poor makers. In the United States they are beginning to think that three months is too short a time to spend in the dairy school. In Iowa they have extended the term to one year. We cannot learn too much about milk and its products, for these are articles that come into our daily life. Take time; improve yourselves as makers and as men. In this way you will be able to rise to a higher degree of usefulness in the world.

I was pleased with the suggestion of our friend from Wisconsin, that meetings of patrons he held from time to time in connection with every factory for the discussion of matters pertaining to the good of all. The farmers are good fellows. Get them together and talk matters over frankly and kindly with them. (Applause.)

GOLD MEDAL AWARD.

Two handsome gold medals were offered by the Windsor Salt Co., one for the best cheese and one for the finest butter exhibited. Prof. Hart and Mr. T. J. Dillon were appointed judges, and awarded both medals to D. Derbyshire & Co., of Brockville. No stipulation had been made regarding the brand of salt used. Mr. Derbyshire reported that his firm had used Windsor salt in the cheese and butter winning the prize

AUDITORS' REPORT.

The report of the auditors was then read and adopted. It will be found in the Appendix.

Mr. WHITTON: I think we have reason to feel proud of the Eastern Cheese and Butter Association. We have spent double the amount of money that our Western brethren have in improving the dairy business, and they are in debt while we have a surplus.

The PRESIDENT: There is no doubt that we run the business as economically as possible. We have received $3,250 from the Government and over $6,000 from the people in the business. They have put their hands in their pockets and helped to employ the seven instructors. We hope during the coming year to be able to do better still.

CHEAPER PRODUCTION OF MILK AND BUTTER.

By C. MARKER, DAIRY SUPERINTENDENT, CALGARY, ALBERTA.

In dealing with this subject I fully recognize that it is a very comprehensive one, and that a great many factors should be considered individually; such as, proper care and feeding of the dairy stock, etc., in endeavoring to solve a problem which has not, in a great many cases, met with the attention which it deserves from those who are directly interested, namely the dairy farmers.

Outside of the initial place of milk production—the farm—great strides have been made during the last few years towards reducing the cost of manufacture and increasing the yield of butter, such as:—

(1) THE INVENTION AND SUBSEQUENT IMPROVEMENT OF THE CENTRIFUGAL CREAM SEPARATOR, which now enables the skilled dairyman to recover 97 to 98 per cent. of the total quantity of butter-fat in the milk, as against the "good old way" of raising the cream by gravity in the deep set pails or in the shallow pans, only recovering from 50 to 90 per cent. of the butter-fat, according to the local condition under which the work has to be done. In defence of the latter or gravity system we sometimes meet with the statement that the cream separator "robs the calves" of the butter fat which they would otherwise get in the skimmed milk. Quite true, yet it is generally conceded by successful dairymen, that butter-fat is not absolutely essential to the growth and development of the young animals, and that we can buy and add to the separator skimmed milk such feed stuffs as oil-cake, meal, flax seeds, etc, which will answer the same purpose as the ten times more valuable butter-fat, when used in the right proportion with the skimmed milk.

(2) THE MANUFACTURE OF BUTTER IN CREAMERIES, leaving in the hands of one or more skilled operators the work of making a uniformly fine quality of butter which can command the highest price throughout the year, as against the more or less primitive way of home churning by the individual milk producer, with the result that the quality of butter made by each would vary from time to time owing, generally, to lack of proper facilities, pressure of other work, and innumerable other causes.

(3) THE INTRODUCTION OF THE BABCOCK MILK TESTER, which enables the careful butter-maker to do better work with the cream separator and churn, by testing the skimmed milk and butter-milk, and using it as a guide in making the best use of the facilities and conditions affecting the work which he has at his command.

So much for reducing cost of manufacture. Now, what has been done, or is being done, towards cheapening the cost of producing milk on the farms? Let each dairyman answer for himself.

Assuming that the dairy farmers of Ontario are following up dairying as a business, *i.e.* for profit, how many of them know the productive capacity of each individual cow in their herds, even approximately, and how much it costs to produce a pound of butter from each cow? This is a question which should be considered by every dairyman.

The facilities which the creameries in the various districts and the Babcock Tester afford the farmers towards solving this problem for themselves should not be underestimated, and this is the phase of the "cheaper production of milk and butter" to which I wish to refer for a moment or two.

Though I have not at hand any accurate statistics showing the average yield of butter per cow each year in Ontario, I venture to say that there is yet a great deal of room for improvement, and that it is quite possible to increase the yield of the dairy herds through a course of good care, comfortable stabling, judicious feeding, selection and breeding.

This process may be comparatively slow, but it is sure. Not long ago I visited a section in Canada where dairying is carried on throughout the whole year; the average output at a certain creamery there was 150 lbs. of butter per cow for a year, while the yields from one of the best herds averaged 250 lbs. per cow. The following table, which I had occasion to compile at the time, shows the variations of yields of the different herds of 41 patrons who furnished milk to the creamery in question:—

9	received from	$15	to	$20	per cow for	12	mon'hs.
18	"	$20	"	$25	"	12	"
7	"	$25	"	$30	"	12	"
5	"	$30	"	$35	"	12	"
1	"	$41.					
1	"	$43.50.					

These are practical figures and speak for themselves. The intelligent use of the scales and tester would work wonders in some of these herds in the way of "showing up" the non-paying individuals.

How can we ascertain the value of dairy stock in a more simple and reliable manner than by careful milking, regular systematic weighing and testing of the milk from the individual cows, and a carefully kept record of the results? Each point is equally essential to attaining correct information on this important question.

Milking. These dairymen who decide to adopt this plan of procedure will not forget that milking should be done as nearly as possible at the same hour morning and evening; at any rate, there should be a uniform interval between the morning and evening milking, from one day to another. It goes without saying that the milking should be thoroughly and carefully done in order to get correct samples for testing, bearing in mind that the first portion of the milk, when drawn, may test as low as 2 per cent. of butter-fat while the latter part may go as high as 7 to 8 per cent. of butter-fat; therefore by thorough milking we not only obtain a better quality but also a larger quantity of milk, as the secretion of milk is stimulated by quick and thorough milking.

Weighing. The milk from each cow, under test, should be weighed, not measured, as soon as it has been drawn morning and evening, at least once a week and on a certain day of each week. The correct weight in pounds and ounces gives more definite information than the very comprehensive terms sometimes used as "A patent pail full twice a day," "A big pail half full at each milking," etc., as the case may be. The weights should be recorded on a slate, blackboard or sheet of paper used for that purpose, opposite the name or number of each cow.

Sampling of Milk. The samples may be kept in tightly corked bottles or jars, labelled with the name or number of each cow, under test, plainly written; also "morning milk" or "evening milk" as the case may be, otherwise the samples are apt to get mixed.

A small closed cupboard nailed to the wall in the stable or milking shed would be the right thing for holding the sample bottles or jars.

As soon as the milk from each cow has been weighed a sample taken with a small tin dipper is put into each respective bottle. A small pinch of powdered "bichromate of potash" is required to preserve the samples from souring until the test is made; this is generally kept in stock at all creameries or cheese factories for use in composite testing of milk sent in by the patrons.

The Testing of the samples can be done by any one who is familiar with the working of the Babcock tester; the local creameries and cheese factories can do a great deal towards encouraging this work by testing the samples for their patrons and others who take it up. The buttermakers and cheesemakers will, no doubt, be only too glad to give any information and assistance in their power, to assist a movement which, if carried out, cannot fail to do a great deal of good all around. Where a weekly sample is taken, the composite test may be made once a month, and the yield of butter-fat for the month calculated and recorded.

A Careful Record should be kept of the yield and test of milk from each cow throughout the season; in this way only will it be possible to study the individuality of each cow as a producer. An occasional test or two shows the quality of milk given at that time only, and it is of very little practical value as a guide, nor is the test without the weights or *vice versa* a reliable indication.

The Scales and Tester should go together hand in hand, throughout the season, and the results will point out among other things the cows which can be kept for profit as well as those which are a constant source of loss to their keeper.

The matter of *selection of cows for breeding purposes* will also be rendered comparatively easy. In fact a thorough knowledge of individuality will give the thoughtful, observing dairymen a large scope for improving his herd from time to time until each animal becomes a source of profit to him. As an eminent writer says: "The interest and pleasure of building up a herd from a few well selected specimens is very great, and if the breeder will form an ideal picture in his mind's eye of a perfect animal and follow it up with patience in spite of disappointment and inevitable drawbacks, though he will not be likely to attain perfection, he will, in due time, be certain to possess a valuable herd profitable to himself."

There is one consideration, however, of which we should not lose sight, namely, that unless the milch cow is well fed and cared for right along, and, as it were, given every opportunity to do good work, not even such otherwise infallible evidence as the scales and Babcock tester can indicate her capacity for milk and butter production. They simply show the returns she makes for the care and attention she is receiving at the hands of her keeper.

Mr. Bird: I was at a creamery the other day and the butter was badly mottled and they did not appear to use any coloring matter whatever. The butter-maker asked me what caused it and I could not tell him.

Mr. Marker: Was it simply mottled or speckled?

Mr. Derbyshire: Just like what we call a "speckled hen."

Mr. Marker: That may be because the salt was improperly incorporated. Work the salt in well so as to get it thoroughly mixed; then leave it a couple of hours or half a day where you have no cold storage.

Mr. Bird: Do you get any "cloudy" butter?

Mr. Marker: That may come from improper salting or it may be the result of using bad coloring matter.

Mr. Whitton: "Cloudy" butter generally comes when the price goes down. Which would you recommend, pasteurizing the milk or pasteurizing the cream?

Mr. Marker: One is as good as the other, almost.

Mr. Whitton: Will pasteurizing the milk do away with a tainted flavor?

Mr. Marker: I think it will.

The President: Do not say that, Mr. Marker. (Laughter.) Tell them that if only one turnip is fed it will ruin the milk for first-class butter. No pasteurizing can fully restore such milk to a perfect flavor—that is, as the average man will practise it.

Mr. Carlaw: You might as well try to turn Niagara Falls back as to get a Scotchman to cease growing turnips. I know from experience that pasteurizing milk will take the turnip flavor out of it.

Mr. WHITTON: A turnip is a turnip wherever you get it. I hate turnips (as a dairyman) like I hate rattlesnakes. In Mr. Carlaw's district we find the greatest turnip flavors in the country.

Mr. CARLAW: Mr. Whitton's firm buys most of the butter in our section, and we notice that the turnip flavor is discovered when prices go down. (Laughter.)

Mr. WHITTON: Joking aside, if we are to bear away the palm in the British market for butter and cheese we must not make these articles from milk with a turnipy flavor. Our President is a large dealer in cheese, and he will back me up in what I say on this point. We who buy cheese get orders in the fall of the year to beware of buying cheese with a turnipy flavor. No one likes turnipy cheese or butter. I had the management of a creamery once, and I said to those who insisted upon feeding turnips that I would close down the creamery if the thing was continued. I told them that if I could not make as good butter as my neighbors I would go out of the business. We cannot afford to feed turnips to cows for butter. I have it from the best authorities that one bushel of ensilage is worth two bushels of turnips for milking cows.

Mr. DERBYSHIRE: I bought much of the butter made at Mr. Whitton's creamery, and if they had continued as in the first few days when the turnips came in I could not have bought any more, and there would have been trouble between us and all concerned. If we want to get the best market, and keep it, we must make fancy butter.

Dr. MILLS: At what temperature do you pasteurize?

Mr. MARKER: At about 160°. It is subjected to that temperature for about an hour per 100 gallons, which will run through in that time. It depends upon the capacity of the machine. The machine contains about two gallons. In Denmark they heat milk for the separator.

Dr. MILLS: Do you ship in prints?

Mr. MARKER: For the local market only. We have shipped in tins to Japan.

Dr. MILLS: What is the cost of cold storage for a factory?

Mr. MARKER: About $200. The cost of labor differs.

Dr. MILLS: What do you make your starter of?

Mr. MARKER: Whole or skim milk. Skim milk by preference.

VOTES OF THANKS.

After the usnal votes of thanks had been passed, the President stated that Dr. Connell, in connection with the Dairy School, would be only too pleased to analyze, free of charge, all samples of cheese spotted or affected in any way.

The convention was then declared adjourned.

CHEESE AND BUTTER ASSOCIATION

OF

WESTERN ONTARIO.

ANNUAL MEETING.

The thirty-second annual convention of the Cheese and Butter Association of Western Ontario was held at Guelph on the 17th, 18th and 19th January, 1899, at the Grand Opera House. The sessions were all very largely attended at the two evening sessions, the Opera House being well filled. The Mayor, members of the City Council and Board of Trade, the citizens of Guelph in general and the Principal of the Ontario Agricultural College and his staff, did everything in their power to entertain the visiting dairymen and make their meeting at Guelph a success.

PRESIDENT'S ADDRESS.

By Harold Eagle, Attercliffe Station.

Some of you may think in bringing this convention to Guelph we made a mistake, because you are outside of the main dairying district. You may think that we possibly would have done better to have stayed in the older district or in fully established dairying districts. The object of the board in coming to the city of Guelph was chiefly because we had received in former years a very pressing invitation to come here; the invitation was repeated this year, and we accepted it for two particular reasons. A large number of the patrons of the cheese factories and members of numerous Farmers' Institutes through the Province of Ontario come to the city of Guelph through the summer months, on what they call Farmers' Institutes excursions, to visit the Agricultural College, and we believe that by calling the convention to Guelph the patrons of factories and a good many of the farmers in certain districts that come here in the summer would take advantage of the cheap railway rates and attend the convention and visit the Farm during this season of the year, and see the most improved methods of feeding and taking care of cattle in winter seasons; and also that a number of cheesemakers who, like myself, started in the business before there were any dairy schools, would attend and visit the excellent dairy school which you have established at the College. Personally, I have had the advantage and opportunity at different times of visiting the dairy schools, but there are a large number of cheese-makers who started when I did who have never done so, and we believe that by having the convention here a large number would avail themselves of the opportunity to visit the School. There seems to be an impression abroad that in bringing the Dairymen's convention to Guelph we had the idea of encouraging farmers in the neighborhood of Guelph to go into the dairy industry. We did not have that idea at all, and we recognize that the principal agricultural industry in the immediate vicinity of Guelph in cattle raising, and that Guelph itself is called the Smithfield of Canada, and we are perfectly satisfied that it should remain so. The cattle men in the vicinity of Guelph, we are sure, will attend our convention. There are a number of them here already, and they will be delighted to listen to the dairy speakers, because the relation between dairy men and cattle men are intimate, and what a good many of our speakers will have to say about dairying will equally apply to cattle feeding.

I desire on this occasion to make a few remarks in refereuce to the unsatisfactory seasons through which we have passed. During the first three months of the present year, with cheese at seven cents per pound, a good many of the patrons and factorymen were a little discouraged. The prices to the ordinary patrons and cheesemakers for first three months of this year was lower than it had been for a good many years, and in addition to this source of discouragement we had an extremely dry spell during the summer, the result being that the make was shorter; and, without a doubt, during the early part of the season, there were a great many more dissatisfied patrons and cheese factory owners than there has been in former years. The season of 1897—a year ago last summer—was one of the best seasons we have ever had. It had copious rainfalls and plenty of pasture. The prices were good, and yet there are many in this audience to-day, and there are men all through this western district, who made more money out of their cows last year than a lot of patrons did in 1897, although it was a good year. The reason they were able to make profits and to develop the dairy industry in the face of low prices and of dry weather was because they were men who had been in the habit of attending conventions of this kind, and of keeping themselves thoroughly posted as to the best methods of feeding and looking after their stock. (Applause).

I wish to refer very briefly to the cheese instructors. I regret to say that our oldest instructor, Mr. T. B. Millar, has sent in his resignation. We are sorry to lose his services, and I am sure we voice the feelings of the Board in saying we wish him every success in his new venture. We required more instructors last year than we could afford to employ. We want for instructors good makers, men who thoroughly understand their business, men who are able and confident to go into factories and make the best butter and cheese in the Province of Ontario. The men of that class who can be employed are few and far between, and I want to point this out because it may possibly influence some good men to accept the position we have to offer. Of course, it is hard work and tiresome work, but it is a stepping-stone to something better. Mr. Millar, our former inspector, is starting in business for himself, and he is making his start under very good auspices, and Mr. Dillon, one of our former instructors, is now dairy instructor at Prince Edward Island. Another of our instructors, Mr. J. A. Hopkins, is employed in Nova Scotia, and another of our instructors, Mr. Ruddick, is now in New Zealand, while the Ontario Agricultural College has recently employed Mr. Morrison to take Mr. Millar's place. I have thrown out these few hints as to the great advancement that has been made by young men employed by this Association, in the hope that it may possibly induce some good cheesemaker to accept the position as instructor for the coming year.

DIRECTORS' REPORT.

GENTLEMEN,—Your Directors beg to submit the following Report for the year 1898:

The object of the Board has been to carry on the work of the Association on the lines laid down by their immediate predecessors in the year 1897. The principles by which they were then apparently governed were two-fold:

1. To expend the funds of the Association only for work actually done.

2. To assist the managers of cheese factories and creameries, who applied for assistance and were willing to pay a proportion of the expenses.

In 1897 the methods adopted by the Board were largely experimental, and their success or failure could only be known after they had been tested by actual experience. The result of the year's experience showed that the means adopted were eminently successful, inasmuch as it showed that the managers of cheese factories were anxious to receive assistance from instructors appointed by the Association, and were, moreover, willing to bear a fair share of the expenses of such help. But the very fact of the success of the measures adopted at that time being so uncertain, the Board felt that it would be unfair to ask high-class men to accept contracts for doing the work of instructor, except on more

liberal terms than they would have been justified in accepting had the remuneration not been uncertain, but assured. The terms agreed to with the instructors being liberal, and the policy successful, the Board soon realized that, at the end of the year, they would come face to face with a heavy deficit.

Your present Board of Directors, while highly approving of all that has been done by their predecessors found on assuming office that they would only be able to appropriate out of their assured revenue the amount of $1,200, for the purpose of instruction at cheese factories and creameries, and had therefore to consider very carefully the best means of carrying on this important work, while at the same time, bringing the financial standing, at the close of the year, to a satisfactory position.

Your Board decided to reduce the number of cheese factory inspectors from three to two; and to employ one instructor for summer creameries in Western Ontario, who would be strictly accountable to this Board, instead of one creamery instructor for the whole Province accountable to the Central Advisory Board, as last year.

It was decided to increase the cheese factory fees to $15 for three visits of one day's duration each, instead of $10 for four visits of one day's duration each; and to pay to the instructors such fees together with a small salary to cover the whole of their time and travelling expenses.

Here again, on account of increasing the fees to the cheese factories, the instructors were asked to accept terms for work, the revenue from which was uncertain, and which might have led to their having to spend their time and energies for a very small remuneration. The Directors desire to publicly thank the instructors, Messrs. T. B. Millar and James Morrison, for the public spirit they displayed in accepting the offer of the Board, and for the energetic manner in which they went to work to carry out the objects the Board had in view, and for the very competent manner in which they have always performed their duties to the Association.

The territory in the charge of this Association comprises the following counties:

County.	Cheese Factory.	Creamery.
Essex	11	1
Kent	6	2
Elgin	24	9
Norfolk	25	7
Haldimand	12	1
Welland	3	1
Lambton	20	3
Huron	19	9
Bruce	21	8
Grey	15	6
Simcoe	20	7
Middlesex	39	14
Oxford	45	18
Brant	10	2

County.	Cheese Factory.	Creamery.
Perth	25	17
Wellington	13	5
Waterloo	9	4
Dufferin	6	1
Lincoln	3	
Wentworth	7	3
Halton	2	3
Peel	5	1
Muskoka	3	
Parry Sound	11	
Algoma	2	
	356	123

Your Directors refer you to the reports of the instructors, from which you will see that there is every reason to be satisfied with the work done, and with the results obtained for the amount of money expended.

Your Directors feel much satisfaction in being able to report that the financial position of the Association is now on a sound footing, and that they are able to hand over the affairs of the Association to the new Board, with the revenue for their year unimpaired, and would strongly urge upon the new Board that the policy adopted during the last two years should be continued and developed.

How it is to be developed is a question that will require serious consideration, but of one thing there is no doubt—it should be on the lines of an increased number of instructors, with very much smaller districts in which to work.

The policy adopted in regard to cheese factory instructors was also adopted for the creameries, but the number of applications for the assistance of instructor from the cream-

eries has been very unsatisfactory. We believe there is a great deal of such kind of work required to help to raise the standard of quality of butter made in Western Ontario to the highest pitch, and it is for the Association, together with everyone connected with the creameries—managers, buttermakers and patrons—to do their utmost to attain this end. However, the directors feel strongly that the money of the Association should only be expended to assist those who are willing to help themselves, on the principle that it is useless to attempt to help those who are not willing to do their part.

REPORT OF INSTRUCTOR T. B. MILLAR.

I take pleasure in presenting to you my eighth annual report.

District.—There was assigned to me Division No. 1, comprising that part of western Ontario north of the main line of the Grand Trunk Railway from Sarnia to Toronto, and as far north as Georgian Bay, comprising the following counties: Huron, Bruce, Grey, Simcoe, Perth, Wellington, Waterloo, Dufferin, Halton and Peel, with Muskoka, Parry Sound and Algoma. To these were added the following counties: Brant, Haldimand, Welland, Lincoln and Wentworth. Where are 183 factories in my division, but the territory that I had to travel over is altogether too large for one instructor to do justice, either to himself or to those who employ him. The distance between factories, in many cases, is so great that of necessity a great deal of valuable time is spent in travelling. Very often I have had to drive from thirty to forty miles between factories where my services were applied for. I would urge upon the directors to make the divisions smaller and employ more instructors.

Instruction.—I made regular visits to thirty-three factories and had to refuse quite a number of applications that I was unable to visit at the time specified in the application. Most of the factory men asked for three visits, some for four, and a few for five visits during the season. I commenced my duties on the 17th May at the Black Creek factory and was kept busy until the end of October.

Milk Tests.—I tested 3,032 samples of milk with the lactometer and 595 samples with the Babcock milk tester. The richest sample I received for inspection tested 6 per cent. of butter fat, and the poorest sample tested 1.6 per cent. butter fat. Three samples tested between 1 and 2 per. cent., thirty-eight samples between 2 and 3 per cent., 471 samples between 3 and 4 per cent., eighty samples between 4 and 5 per cent., and three samples between 5 and 6 per cent. butter fat. Samples of milk taken from the vats during the month of May, June and July, tested from 3.2 to 3.6 per cent. butter fat, and in August, September and October, from 3.5 to 4 per cent. of butter fat.

Prosecutions.—Eight patrons were prosecuted and fined for tampering with the milk sent to the factories. Five of these were for diluting with water and the others for taking cream. They all pleaded guilty and were fined from $5 to $20 with costs. Only two of the factories that I visited were paying for milk according to quality.

Condition of Factories.—The majority of the factories that I visited might be classed as clean, some were fairly clean and a few were positively dirty. It gives me pleasure to report that during the last two or there years there has been a decided improvement in the cleanliness of the factories, though there is still room for improvement along this line.

Sanitation.—Regarding sanitary condition I may say I found one factory perfect, four factories good, twenty-five factories fair, one factory bad, and two factories very bad.

Curing-room.—The temperature in the curing-rooms varied from 60° to 88°. If we are to retain our reputation in the English market we must be able to control the temperature of the curing-rooms. They should never be above 70° and would be better at a lower temperature—about 65°.

Quality.—In many cases the quality of the cheese was not satisfactory. Our cheesemakers are certainly not losing the art. They are just as anxious, and having been putting forth their best efforts to make fine cheese. Then why so much poor cheese? It is due to several causes. First, the condition under which many of the makers are working, by being bound to make good all losses arising on account of poor quality, no matter from what cause. Second, the very low price of cheese during the past season caused the patrons to become indifferent to taking proper care of their milk. The result was the worst lot of milk, both dirty and bad flavored, much of it in rusty cans, that I ever saw delivered at cheese factories. Until we put more responsibility on the people who produce the milk, we will never get satisfactery results. You will all agree with me that the quality of the finished product depends largely upon the raw material used, hence the necessity of having the milk for cheese-making delivered in first-class condition.

Whey.—The system of returning the whey in the cans is practised as largely as ever, but I am glad to say that the factorymen are paying more attention to the tanks, in many places the tanks being quite clean, a great change for the better during the last few years.

Alsike Clover.—The following question has been asked me several times during the past season: Will the feeding of Alsike clover to milch cows produce gas in the milk? I am not clear on that point; perhaps there is some one present who can give a definite answer to this question. One thing, I have noticed where the pastures are largely made up of alsike clover that the cheese-makers are troubled with very gassy, slow working curds, and I have been told by private dairymen that the only time they had gassy curds was when their cows were pasturing on alsike clover.

Silos.—I am please to report that a great many silos were erected during the past season, meaning more corn, better milk and more of it.

Thanks.—I take this opportunity of thanking the officers of this Association and dairymen for their kindness extended to me during the past season.

Kincardine, Jan. 17th, 1899. T. B. Millar.

REPORT OF INSTRUCTOR JAMES MORRISON.

Gentlemen.—I have much pleasure in presenting to you my second annual report:

District.—The district in which I was employed was the southwestern portion of western Ontario, comprising the counties of Essex, Kent, Elgin, Middlesex, Oxford, Norfolk and Lambton.

Instruction at Factories.—In this district there are 167 cheese factories in operation. I visited forty-three of these, giving from one to four visits each. My work for the Association commenced on the 3rd of May and finished on the 22nd of October. I spent 102 days in the factories with the makers, and six days attending to cases where milk had been tampered with, making in all 108 days.

Whey.—Thirty-eight of these factories return the whey to their patrons in the milk cans. At a number of these factories the whey tanks are kept fairly clean, some of the cheesemakers making it a rule to clean out their whey tanks once every week, others every two weeks, but at some of the factories the tanks are not cleaned out from spring to fall, and are in a terrible state. Where the tanks are in the ground it may be a good deal of work to clean them out, as the pump will not draw the whey all the way from the bottom, and so leaves some to be dipped out with pails. But whenever a cheese-maker makes up his mind to clean his tank every week, and puts forth an effort to do so, it can be done all right. It will well repay him for his trouble by enabling the patrons to deliver to him their milk in much better condition all the season.

Elevated Whey Tanks.—I would advise all factorymen who have not now got their whey tanks elevated to do so next spring before starting the factory. I am sure they will never regret it, if only on account of the ease with which they can be kept clean, compared with the underground tank.

Making-Rooms.—During the past season I noticed a great improvement in the making-room at a number of the factories, from the year before, in the way of new floors, and a general fixing up, chiefly on account of butter plants for winter butter-making having been added to the factory equipment. But there are some about which nothing good can be said—poor floors, no drainage whatever, and wash-water lying under the factories in some place for weeks—in fact the whole season—causing in warm weather a terrible smell.

Sanitation.—Sanitary inspectors should be appointed to look after these factories, and should give them but a very short time to improve their premises or else close their doors. It was a surprise to me that the boards of health in some municipalities allowed such stenches and smells along the public highways as one will meet with when approaching some of our factories.

Curing-rooms.—The majority of the curing-rooms in our factories are far from what they should be, the temperature ranging all the way from 45° in spring and fall to 90° in the warm weather, generally about the same temperature as the air outside. Even with our curing-rooms constructed as they are at present this can be remedied a great deal by putting in furnaces for use in cold weather, and by using ice in warm weather.

Use of Ice.—Some of the makers who use ice allow their rooms to become heated up before putting the ice in. This is a mistake. Seldom can the temperature of a room be reduced by the use of ice, but it can be held in check. If the ice is placed in the room when the temperature is not higher than 65° much less ice will be required, and the cheese held at from 10 to 15° lower temperature than would otherwise be the case in hot weather.

Starters and Bandaging.—Some of the makers, early last season, were using too much starter, and ripening their milk too much before applying the rennet causing the curds to develop acid too quickly in the whey, and dipping in from one hour and a half to two hours, which is altogether too quick to make fine cheese. Other makers were bandaging too soon after putting the curd in the hoops, before the pieces of curd had united and become solid. The consequence of this practice is that the curd will spring apart and open up when the cheese are taken out to bandage, and the cheese will not press together again and be as firm and close as they would have been had they been left long enough in the press before bandaging.

Sink and Sink Cloths.—I noticed a great improvement with some makers in the way in which they kept their curd sinks and sink cloths, from last season; with others, no improvement at all. There is no use whatever for a cheesemaker who keeps a dirty factory, to dictate to his patrons about keeping their milk cans clean or sending their milk in proper condition, until he, first of all, cleans up both himself and factory, and not only cleans them up but keeps them clean.

Bad Flavors.—In a great number of factories the patrons are to blame for a great many of the flavors that develop in the cheese after they are cured, by not straining their milk. In fact, at some factories, one need not be surprised at seeing almost anything you could mention (small enough to go through the tap of the milk can) collect on the strainer. If every cheese maker would inform the patrons before starting making cheese in the spring, that they were going to return all unstrained milk to the patron sending it and do so in every instance, they would soon receive their milk in a great deal better condition for making fine cheese.

Milk Tests.—I tested 3,382 samples of milk with the Quevenne lactometer and 265 samples with the Babcock milk tester. Of these,

6	samples	tested between	1 and 2 per cent.
22	"	"	2 and 3 "
203	"	"	3 and 4 "
34	"	4 per cent. and over.	

Five of the factories visited were paying for milk according to the per cent. of fat as determined by the Babcock test. I did not test the milk at any of these factories, as the makers were quite satisfied with the quality of the milk they were receiving.

PROSECUTIONS.—Fourteen patrons were fined for sending adulterated milk to the factory. One of these patrons was fined the second time, making fifteen cases altogether. Of these cases, there was one in Essex county, one in Kent, one in Norfolk, three in Oxford, four in Elgin, and five in Middlesex. Fines varying from $5 and costs to $20 and costs were imposed by the magistrates, which amounted to $155 in fines and $52 35 costs, or a total of $207.35. There were other patrons who admitted tampering with their milk, but as the factorymen did not want to prosecute them as it was their first offence, they were let off with a warning.

FACTORY SURROUNDINGS.—Before concluding my report, I would ask every cheese-maker, before starting the factory next spring, to clean up the surroundings of the factory, draw away all old vats or presses that may have been lying around for years, pile up the wood, repair the fences, do all they can to make the factory look well from the outside, and from the starting of the factory keep it, and everything inside, clean and tidy.

ATTENTION TO DETAILS.—Turn the chese in the hoops every morning, stencil the date and number of vat on every cheese, keep a diary of every day's make, and the working of each curd. Wash out the whey tank once a week, all season. And I am sure at the end of the season your directors will say unto you, "Well done, good and faithful servant, enter thou into our factory for another year at a higher salary."

THANKS.—In conclusion, I take this opportunity to thank the president and directors of this Association, and the cheese-makers and officers of the factories, for the courtesy and kindness extended to me throughout the season.

All of which is respectfully submitted.

JAMES MORRISON, Instructor.

REPORT OF JAMES STRUTHERS, INSTRUCTOR OF SUMMER CREAMERIES.

It is more from a feeling of duty than of pleasure that I present this my first report for your consideration. I accepted from your Board early in April the position of instructor of summer creameries in Western Ontario, agreeing with the Board to visit only factories that had made application for my services. A circular was sent out to each of the creameries by the Secretary, giving notice of the appointment and of the terms, also reminding them of the benefit likely to be derived from one or more visits from the instructor, but from a feeling of indifference amongst the butter-makers (a spirit of I-know-it-all) very few applications were made for my assistance.

The first application was made by the new manager of Pleasant View creamery, who applied for two days of my service, to assist him in putting his creamery in operation, and posting the different operators in the proper method of doing the work allotted to each. The interior of the creamery was in excellent condition, having received a thorough coating of whitewash; a cold storage, which is built on the Government plan, had additional ice chambers placed in it, and the whole plant was in excellent condition for a start. A very successful opening was made.

On the last of May I had on hand applications from three different creameries for one visit each; these were made on the 1st, 2nd and 3rd of June. To make these visits

I was compelled to travel 450 miles. About the first of July applications were received for two other visits, which were made on the 13th and 14th of July, travelling a distance of 190 miles to accomplish it. This completed my season's work, giving me very little upon which to report.

Four out of five of these creameries were in nice condition. One, however, had a patch of loose floor near the churn which allowed milk and water to accumulate, and in warm weather give trouble. I advised the manager to have it repaired.

The fifth creamery was in great disorder. Strewn around the churning and butter working room were empty boxes, old and empty butter tubs, empty baskets, old unused milk cans, pails, etc., sufficient to fill a large waggon box. I felt sorry for the manager, as he and I stood together and viewed the disorderly scene. He seemed ashamed to be caught in such a condition, and apparently resolved to find a more suitable place to store this useless trumpery The walls and ceilings had been neglected, not having received the necessary coat of whitewash. His wash sink was in a corner of the butter-working room, where oil tests were melted, bottles washed and other appliances cleaned, making it necessary to keep hot water in the sink. This raised the temperature of the room to an objectionable degree in warm weather. It also kept the place in confusion. A suitable place for his sink was found in a shed outside, where he agreed to place it at once.

I corrected the speed of his churns, which he had running at a rate of sixty revolutions a minute. We reduced the speed to a good churning condition, and found we had them making a trifle over forty rounds per minute. I have forgotten the name of the professor he mentioned as his authority for the sixty rounds movement. I also found him much perplexed over a statement made by a respected professor at our last convention held in London. The professor when asked at what temperature he would recommend butter be worked at, replied by saying, at a temperature of fifty, and not higher. The creamery manager complained that he found it difficult to keep the temperature of the butter down to that degree in summer weather, and that butter he had worked at that temperature did not appear satisfactory. I assured him that the professor had made a slight mistake, that in my large experience in working high class butter with my work-room at a temperature of sixty, and the butter at the same degree, the very best results were obtained. I was satisfied if the professor had to face a stack of butter containing daily from 1,500 to 2,000 pounds with a hand lever butter worker, the same as in the creamery in which I worked, he would find that he had struck too low a temperature for his own comfort, and for the best results.

At all the creameries, with the exception of two, the drains were fairly good. These two had been allowed to become obstructed with offensive matter which threatened trouble when hot weather set in. I showed those in charge what was required to prevent trouble. They agreed with me and promised to attend to the drains at once.

Four of the creameries were whitewashed throughout, giving them a wholesome, as well as a neat appearance. One of the factories had been painted with lead and oil, and although it was scrupulously clean it gave it a disagreeable smell not welcome in a butter factory. Four of the creameries were provided with excellent cold storage, built on the Government plan, registering at the time of my visit 35 degrees F.

At each factory I found the thermometers correct. One test I made showed my glass and the factory glass alike when tried at a low temperature, but at a high temperature showed a difference of three degrees. Four of the creameries packed their butter in 112 pound casks, two in square fifty-six pound boxes, all using parchment lining.

Four of the creameries disposed of the buttermilk to farmers, who hauled it away for feeding purposes. Two of the creameries fed the milk on the premises. One of those two had upwards of 100 hogs running in a yard close by the creamery; one place opposite a door where the cream was taken in was where the hogs were attracted by a large mud hole. I measured the distance and found it sixty-two feet from the door. In addition to this, at a distance of 220 feet at the nearest point from the creamery, was another large pen containing 100 hogs. The day on which I visited the creamery was very hot,

and in the evening the atmosphere about the creamery was loaded with a foul smell, caused by the piggery. I called the attention of the proprietor to the fact, telling him that something must be done to improve the present condition, if he wished to preserve the good name of his creamery. He professed having great faith in sawdust and shingle shavings as a preventive of a spread of such bad odor, and said he would order a coating at once. I made the request that if this remedy failed he would remove the hogs nearest the creamery to a safe distance, and exercise more care over the sanitary condition of the hogs in the pen. The proprietor expressed his willingness to follow my instructions.

I had occasion to lecture two cream collectors during the season—one for keeping his clothing in a filthy condition. His clothes were grease from his shoulders to his knees, and he shone like a greased pig. I told him it was his duty as well as his privilege to correct anything he saw amiss at the farm dairy, and it would have a good influence if he kept himself clean and tidy, but as long as he kept himself in his present condition his influence would not be so good.

The other collector I reproved for spending too much time on the road, thereby preventing the cream from being cared for at the proper time. It seemed that although he had no greater distance to travel than the others, he was always two or three hours later in reaching the creamery. I pointed out to him the disadvantage of having cream standing so long on the road, also the injustice he was doing those in charge of the factory, in keeping them two or three hours later on his account. I urged him to bring his cream home without any unnecessary delay or danger. Both men took their lecture well, and I think all concerned would be benefitted.

I would not have those who are interested in the welfare of the dairy industry of Western Ontario, neither those who are intrusted with its development, to be too much flattered with the present condition of the creameries. It is a lamentable fact that not more than ten per cent. of the butter manufactured in this part of the Province would class as No. 1 creamery.

I feel that this statement is quite within the mark, judging from what I have seen in my travels, and what butter buyers have told me—also from what we see at our great Canadian fairs, where as many as twenty creameries are represented, and probably not more than three of these reach a score of 90, the balance scoring 85, 80, 75, 70, and also as low as 65 out of 100.

Now I find one cause why so much low grade butter is made is by an improper application of salt, on account of the buttermaker not knowing its effect on butter, coupled with a spirit of greed, or an over desire to have his butter to hold out in weight. The same cause wrought disaster and loss to the farm dairy in the days of the old dash churn. The butter was gathered into a mass in the churn, then lifted with the hand or wooden ladle into a large wooden bowl or tray. The butter then received what the dairy maid thought a thorough washing with cold water, but she only succeeded in removing the milk from the outer surface of the mass. The salt was then applied, in the majority of the cases from the hand without weight or measure, and certainly without stint. The whole mass was mixed and worked in the butter bowl until the salt was thoroughly mixed into the butter. The butter was then put up in large rolls or prints, sometimes crocks or tubs, and offered for sale—you may be sure not always pronounced No. 1 by the consumer.

Five out of the six creameries that I visited this summer salted their butter in a mass on the worker, and, after a thorough mixing, packed it at once in square boxes or casks. One of the buttermakers differed a little from this process. He worked his butter twice, allowing it to stand two or three hours between workings. This allowed the salt time to dissolve, and enabled him to work off a surplus of objectionable moisture, which would otherwise have been sold, followed by bad effects.

In all these creameries I explained to the operators what I found to be a successful method, in three of these taking charge of the churn myself, thus giving the employees a practical lesson in the method of salting and working butter. One of the creameries

at last adopted the system I recommended, at least long enough to prepare an excellent exhibit for Canada's biggest fair, where the said exhibit made an unparalled record, some lots scoring as high as 97 out of the 100. But I am sorry to believe that after the exhibition the creamery adopted the old method, the proprietor giving as his principal reason that the system that I recommended did not allow enough moisture to remain in the butter to suit him.

In conclusion, I would say, that the sooner dairymen learn the true nature of dairy salt and its proper care and application, the sooner will Canada have a correct method of making butter—when our dairy schools will teach, and our buttermakers practice, the one method only of salting butter while in the grain.

All of which I respectfully submit,

JAMES STRUTHERS.

WESTERN ONTARIO DAIRYING—THE PAST.

BY HAROLD EAGLE, ATTERCLIFFE STATION.

I wish this subject had fallen to abler hands, as I feel that I am unable to do it justice. However, I might say as one of the men of the present that we all owe a good deal more than we realize to the men in the past, who started the dairy industry, and kept it going in western Ontario. (Hear, hear). I know of but few men in this western country who, before Hon. Thomas Ballantyne started the first cheese factory in western Ontario had good farms. They had hardly any implements, no stock, and a good many of them had mortgages, but after cheese factories were started and established and had been kept going for a short time, the mortgages were cleared and the farms cleared and improved, and these men at the present day are some of them wealthy, and are the most successful men in western Ontario, and this state of affairs is due mostly to the pioneers of this association, the men who did the pioneer work in this movement. I remember when, as a young man, I always sat away back in the farthest corner listening to the speakers, when I first attended the Association. I remember that at that time New York cheese was selling for a half cent to one cent more than Canadian cheese. The men in New York started taking the cream off the milk in the fall of the year, claiming that they could make just as good cheese out of the milk after they had extracted the cream as they did before, and after removing the cream from the milk in the fall they then commenced taking the cream from the milk in the spring. A number of you who were present at this meeting will remember that time. The patrons of the cheese factories of western Ontario used to talk from the floor to the men who were on the platform. They asked if New York men could make it out of skim milk why could not we in the western district do the same. I remember the Hon. Mr. Ballantyne stating that the people in the States who were doing that were burning the candle at both ends and that it could not last, and at the same time he strongly advised, and, in fact, insisted, that whatever class of goods the Canadians made they should be honest, and that they should be all full milk cheese. I think that was one of the things in which the men of that time built possibly better than they knew. Had they consented to have the cream removed from the milk we could not possibly have attained the exalted position we now occupy in the cheese market with the excellent cheese we are now able to place upon the markets of the world.

THE PRESENT AND FUTURE OF CHEESEMAKING.

MR. A. F. MCLAREN, M.P., STRATFORD.

I must say that I am delighted to see this Association meet for the first time in the city of Guelph, and I am very much pleased to see such a large turnout at this, our first meeting. I think we have as large a number, if not larger, than we usually have at our

first meeting. If we want to go on improving, we had better start right here and now. Do not put it off from year to year, but start right now to improve. I think the present methods are all right, but I am sorry to say that in every case, we do not find them carried out. We find in some factories that they are carried out to the letter, but in others I find that any old method will do. The factory is dirty ; everything around it is disorderly and in an untidy shape—floors wet and dirty and the whole surroundings looking anything but clean and tidy. In other factories you find the makers carrying out the excellent instructions they have received from Prof. Dean, and in others you see such a state that you would conclude that they had never seen a Dairy School or been inside of one in their lives. At the present time we have here in the city of Guelph upwards of eighty pupils who are receiving the very best of instruction under the latest methods and systems, and if they only follow these instructions out, there is no doubt in the world but that they will improve. The Dairy School is almost overflowing, and I want to ask from the cheese men who are here, how many of them go home and carry out the instructions they have received at the Dairy School? I must say a good many do not, and I was going to suggest to Prof. Dean and Principal Mills that they follow up these pupils, follow them into their factories in the country where they are employed, and see the way they are carrying out the instructions they have received. I think if the pupils knew that their teachers were going to follow them up in their factories they would be very sorry indeed to have Prof. Dean come around and find everything upside down in the factories in which they were employed. I think it would be a very good idea for some such system as that to be adopted, because I think if Prof. Dean saw some of the pupils I have seen who were educated here, and the manner in which they were carrying out their instructions, he would be as disgusted as I have been. On the other hand I have found men whom I was proud of, and pleased indeed to find that they, having received good instructions here, were carrying them out in the factories, and that they were producing good results. I would like to see the young men who attend the Dairy School of Guelph carry out the instructions they have received, and I am sure that if they did we would have fewer complaints as to the cheese made in Western Ontario. Another point I wish to speak on is the relationship between the patron and the cheesemaker at the factory. In many cases the milk is returned to the patron, and in lots of cases milk is not returned that should have been. In some cases they send the milk right back, and tell the milk-hauler to tell the patron that it was bad milk, and then the patron becomes indignant and angry. I think that the better plan would be for the cheesemaker to follow this milk up when he has time, go to the patron and explain to him that his milk was bad, tell him what he thought was the matter, and what was the cause, and set to work to try to find out some remedy for it. I think a great deal of good could be done in this way. Half the trouble would not exist if the cheesemaker followed the milk up and directed the farmer how to take care of it, and the farmer would feel kindly towards him for his efforts in that direction. For my part I would not fight with the patron as long as there is a dollar in it ; I would stay right with him every time.

There is another trouble existing in cheese factories, and I do not think I have heard it discussed at this convention. It is a very small matter in its way, still it sometimes creates large results, that is the fly question. I have heard of them keeping the flies out of the curing-rooms, but we seldom hear of them keeping them out of the making-rooms. I have seen flies in the summer time—I have found vats simply covered with them. That is something I could never bear when I was making cheese, and I always tried to kill the flies. I remember going into a factory two years ago, and I found it very thick with flies, so I went to work, took off my coat, and started scalding these flies to death. I got several barrels of hot water and commenced slopping it over the walls, vats and sinks, and presses, and I got the flies floating down the gutters in thousands. I remained there all afternoon and left the factory with very few flies. I am telling you this in the hope that it will be a lesson. This factory I was telling you about was not in Canada, it was just over the border. I went back there a year from that time, and I found that the man had screens on all his windows and doors. There were very few flies

in his factory, and he told me that he had decided to put a screen in front of his milk stand and to have a door on his milk stand, in order to keep the flies out; and I would like to see flies kept out of cheese factories all over the Province of Ontario.

I think while here we should visit the Dairy School. I think it would be an object lesson, and I hope and trust every person here will do so. I want you to examine everything—to look at the floors and gutters, whey stands, curd sinks, and wash tins; watch how the boys are dressed and how clean and tidy they look—and then probably you will come to the conclusion you may eat some of the butter and cheese they make out there. I want you to carry the lesson out to a practical result, and adopt the same system in your own factory. I visited a butter factory not a hundred miles from Guelph the other day, and found the floor all over milk and water, and everything most disgusting. I looked at the man for a while, and with a good deal of fear and trembling I asked him if he had ever been in Guelph. He said "Yes; I attended there three years." I said, "What! in the Dairy School?" I do not think he claimed to be three years in the Dairy School, but he claimed to be three years in connection with Guelph College. I could scarcely believe that this cheesemaker had ever been there.

I am going to speak for a few moments about these splendid reports we have had from Mr. Morrison and Mr. Millar. Mr. Morrison's report is exceptionally fine, and I am much pleased to see that he finds so much improvement in the section of the country in which he has travelled, but at the same time I regret to know that he does not find more improvement, because in that section there is certainly room for improvement in the cheese factories. In speaking of the whey tanks, he advocated the raising of them. Some of the factories have have the tanks in the ground and it is very hard therefore to clean them out. He speaks of some factories where the tanks are cleaned out once a week, and others twice a week, and a few once a year, and some not cleaned out at all. To think for one moment that any cheesemaker would allow patrons of the factory to drive up to one of these tanks where the whey has not been removed for a whole season, and pump it into a clean milk can that is used for carrying milk to make food for human beings, is almost beyond my comprehension. I do not think any man who would do that is worthy the name of cheesemaker. I think it is a very serious matter. I agree with Mr. Morrison that it is a good idea to have all the tanks raised so that they can be cleaned out more quickly. Mr. Morrison also reports that he finds the floors, gutters and everything about the cheese factories better than they were last year. I was in hopes that this was due to the scolding I gave you last year. I made cheese for five years, and I have been visiting factories for twenty years, and I know what I am talking about, and I sympathise with the man who does not keep his factory right. I feel very sorry for his ignorance. I think the companies that employ cheesemakers should pay them well. When I was making cheese, they paid better wages than some of them do now, and I used to hire help to keep my factory clean. Now they pay small wages, and where they do so I think that they deserve to get poor cheese. I think they should buy first-class supplies, and have everything right up-to-date, because a sixteenth part of a cent. per pound will soon pay for cleaning out the tanks and doing everything well.

Another great trouble during the past year has been with regard to the inspection of cheese and the proper handling of it. Many times the buyer has been blamed when he ought not to have been, the cheesemaker has been blamed when he should not have been blamed, and I would like to see the man who deserves the blame get it. I think it a shame that cheesemakers have had to put out money to pay for bad cheese when it has been the fault of the patrons who have not properly cared for their milk. On the other hand many times the patrons have suffered because the cheesemaker had not done his part properly. I think the time has come when these things should be remedied.

In my opinion there is no necessity for having the floor of a cheese factory wet except when you are scrubbing it. I would not allow one drop of water on the floor of a cheese factory except when it was being scrubbed. I would have everything dry and clean. Some makers get so careless that they splash water all over the factory. The factory should be so arranged that it would not be necessary to splash water on the floor. Mr. Barr told us last year of having an immense vat where they washed everything.

They did not pile them on the floor and wash them there. I remember the time when I used to fling them on the floor myself, and come along with a scrubbing brush and a lot of hot water and wash them on the floor. I used to think that was part of the business. I would like to see some of the cheesemakers who have dry factories, and all the appliances for keeping their factories dry, stand up on the floor before they leave and tell the other fellows how to do it; and if the other fellows have not got the proper appliances let them insist on having them, and when they engage to work for other factories let them make that part of their agreement—that they must have proper appliances for doing good work. The great trouble with cheesemakers is that they are all running after the factories willing to do anything, as long as they get a factory. "Give me a factory, and I will make you cheese." But if they combine together and agree not to take a factory unless they have everything in proper shape for making good cheese, then they would elevate the business, and if the patrons and companies would pay good wages, they would be able to command good men and would not be turning the best men out of the business.

ADDRESSES OF WELCOME.

The evening session was open to the public, and they turned out in large numbers, the Opera House being filled to the doors. During the evening an orchestra played several selections in excellent style.

Principal Mills of the Ontario Agricultural College, in his usual excellent style, welcomed the dairymen to the city of Guelph, and more particularly to the Ontario Agricultural College. His remarks were listened to with rapt attention, and he was loudly applauded on taking his seat.

Alderman Drew in a very happy manner welcomed the delegates to the city of Guelph, to which the President suitably replied.

THE STATUS AND WORK OF THE EXPERIMENTAL STATIONS.

By W. H. Jordan, Director New York State Experiment Station, Geneva, N. Y.

When one of your directors fastened this badge on me, a badge which I feel honored in wearing, I noticed on the first side I looked at a very good picture of a cow; that aroused my admiration, because I have a very great respect for that modern enigma, the dairy cow. When I looked on the other side and found the stars and stripes, that I love, and the flag of the British Empire, which I revere, my sentiments were aroused, and I felt I was among friends. (Great applause).

So I am glad to be with you to-night, for the first time, and look you in the face I regret that I come at this point in the programme, because the subject assigned to me to-night, "The Status and Work of the Experimental Stations," is one that I am fond of talking about, and am very much afraid that I shall interfere if I am not called to order, with those who are to follow, and who are more worthy of your attention.

I think it is well for us to stop once and a while and take account of the great movements that are going on about us Now, there began more than half a century ago, a movement that has affected humanity profoundly—the movement of man to understand himself and his environment, to get a knowledge of those forces that impinge upon him every day—that make for his weal or his woe.

The foundation of the American experiment station was laid in the year 1862, when the Congress of the United States did a noteworthy thing. When we recount the history of the civil war, during which time you stood in such kindly attitude towards the north;

when we think of the battles, and of the turmoil and disturbances that were going on in the United States during that period, you will be impressed when I tell you that the Congress in the spring of 1862, stopped deliberately in the midst of these great questions, with the enemy almost upon the national capitol, to legislate into existence one of the wisest schemes of popular education that was ever inaugurated, the establishment of the Land Grant Colleges in the United States. You have here with you to-night a distinguished president of one of these colleges, Dr. Beardshear, of Iowa. The foundation of these colleges was laid in the act of 1862, and later in 1887 the Congress passed a law donating a certain sum of money to each state to be used in the maintenance of experiment stations.

Since then there has been a wonderful change in the status of agriculture. If you go among farmers you find that the conversation is vastly different from what it was once. I remember when I was a youngster I used to attend the agricultural conventions. The discussions were somewhat profitless, opinions were as varied as the individuals who expressed them, and demonstrated facts were few. In those days agricultural knowledge was largely a matter of tradition, and what we call experience. Now, if there is anything in the world that is misleading, and that is a source of error, it is a certain kind of experience. Science, you know, is experience, but science is as complete an experience as can be had, whereas experience in practice often stops short of completeness, and false deductions are thereby drawn.

The change that has come to the thought and discussion of agriculture, in the United States as well as all over the world is wonderful. No great movement in human thought, touches one people or one nation alone. It spreads everywhere. The change that has come is this: That we are reasoning more from certain fundamentals that have been established from the severest possible investigation. Our literature and our discussions deal now with matters of science to quite an extent. You will hear in every farmers' convention the words, protein, carbohydrates, phosphoric acid, nitrogen, and potash. This means that we have begun to think from fundamentals, which have been laid in scientific investigation. I am not here to apologize for science. I remember when first, years ago, I started to do institute work in the State of Maine, the way in which I was regarded. We would hold a meeting in one of the school-houses of that State, and there would be half a dozen men around the stove, looking at me sideways, and doubtfully, as a new kind of creature—one of those scientific fellows—and there was scepticism as to the value of science. In many cases it was honest scepticism, but still it existed. But not even then would I apologize for taking part in that movement which was intended to benefit agriculture. And to night in view of the wonderful things that have been accomplished in the last twenty five years, I glory in what has been done. (Applause) There are sceptics to-day, in regard to the work of the experiment stations, but I think it is because they misconceive the real function of these institutions. Let me tell you first of all, that the experimental station is not an institution that has to deal with business conditions very largely, if it keeps its proper place and function. It has been supposed by many that the experiment station was to furnish the farmer with rules whereby he might know just when and how to use certain things. Now, the experiment station is not to furnish rules, but it should furnish fundamental facts of universal application, and the business method is to be worked out on the basis of these facts according to the circumstances. The experiment station will never create good business capacity. I remember once speaking at an institute, when a man rose in the middle of my talk, and said, "Hold on, young man, that may be all right, but we know nothing about it; what I want you to tell us is how to make more money." (Laughter). Well, I think I had an inspiration when I answered him, for I said, "Friend, if I could have selected your ancestors for several generations, and could have had the training of you, possibly I could made a good business man of you, but in no other way." (Applause). The function of the experiment station is not to create business capacity, but to furnish business men with facts for their instruction, and they are to adapt them to their particular circumstances.

How shall this be done? There are three kinds of work that experiment stations and these institutions of investigation are trying to do. First of all they are trying to search out the fundamental principles—those we speak of as scientific. Let me illustrate. We have the clover plant, and a great deal is said about its value, in agriculture. We have puzzled a great deal over the clover plant problem. Now, no safe thinking, or safe reasoning, can ever be accomplished without you understand the fundamental facts. Years ago Lawes and Gilbert, of England, decided that the clover plant and no other plant could take free nitrogen from the air. More recently, German investigators, and American investigators, decided this to be a mistake, but they came to that decision only after severe and continued research. In the same way we have ascertained another fact that is important, which is that the clover plant harbors another plant; that there is a minute organism that is not part of the clover plant, but which finds its home in the clover plant, in whose absence the clover plant cannot take nitrogen from the air, a fact that has been made use of to produce conditions such as are necessary for improving the agriculture of the world. The benefits from the application of that single fact are almost infinite. I want to say to you frankly, to-night, that notwithstanding the respect I have for other kinds of work the stations are doing, I regard this sort as fundamental and essential. Do not find fault with your workers in science in the Dominion of Canada, if they retire within their closets, and devote themselves to these severe scientific problems, because when they emerge, they will bring you beneficent facts. (Applause).

Do not place upon these investigators other burdens too heavy to bear. We make the mistake in the States in placing upon our investigators too much teaching work. No man can be an institute speaker and a teacher several hours of the week, and at the same time retain the energy and strength that he ought to have for severe investigation. The agriculture of America is profitable enough, and important enough, that you should provide men with means and time to do all these things. I am exceedingly anxious that all the experiments that our stations are undertaking shall be as severe, as dignified, and command as great respect, as the investigations anywhere, and I believe that when we have given the American people a little more time to develop their genius of discovery there is no people on the face of the earth that will outstrip us in the search after truth.

Then the other work is what I would call the experiments as to the application of scientific facts, such as the testing of the practical value of feeding standards. Besides we have had what might be called business experiments of more or less local importance, such as the relative value of certain forage or grain crops for growing swine.

These are valuable and important, but they are often local business questions, and I doubt whether practical agriculture cannot work out these questions more satisfactorily. I believe you will do well to hold your investigators to a search after the fundamentals. Let me mention an experiment conducted at the New York Experiment Station. One of the old problems has been, the source of milk fat. Governor Hoard said in the first speech I ever heard him make, that the inside of the cow is the darkest place in the universe, and that comes pretty near being right. The changes the food undergoes are among the most profound things we have ever come to study, and we have had before us that old problem about the source of fat in the cow's milk until I had begun to grow rather tired of it. It came up at every institute, and it was no use to discuss it because we were lacking in fundamental knowledge. I sent to the Cleveland Linseed Oil Co at Chicago a lot of chopped timothy hay, ground oats and ground corn, and had that material put in one of their large vats, and by the use of a solvent they took nearly all of the oil out of the food. The farmer has been sure that it is the fat in the food that is the source of the fat in the milk I was perfectly willing to believe anything. I selected a Jersey cow, one that I thought possessed a good appetite. We fed her the food after being treated for ninety days and in that time she ate but five or six pounds of oil. The cow did not stop giving milk and she did not stop producing butter fat In the time stated she produced over sixty-seven pounds of butter with less than six pounds of fat in the food. How did she do it? She did not take the butter fat out of her body because she was lean when she started, and did not have seventy-five pounds in her body altogether. Moreover she was a heavier cow after we got through than when we started.

Bless you, that is the cow's business to make butter fat. I do not know what will be the practical application of that investigation. I am not troubling myself about that. No truth was ever established that did not somewhere find a beneficent use by humanity, and so I want to keep at laying foundations rather than attending to those business conditions which farmers know more about than I do. It would be foolish for me to attempt to teach farmers with regard to their particular business on their particular farms in their particular locality. That is their province and not mine. We might as well have it understood first as last that while the stations and colleges are doing something there is a large amount of work to be done by the farmer himself in taking to himself and absorbing the facts and the principles that are put before him. We have in the United States fifty five stations. There are between six and seven hundred men at work in them. They are expending annually about one million and a quarter dollars. We are doing some good work and some poor work. Four hundred and thirty odd bulletins are published annually, not all of them worth reading. This effort was sprung upon the American people when there were scarcely any workers ready who had the genius of investigation. They had not been trained for it. But we have made a start and we are improving. Besides these stations we have a central office at Washington whose work is to co-ordinate the results that the stations are reaching, making the results of the stations available to the workers and the public. This is, to my mind, a valuable adjunct to our system. The literature that we have published consists of annual reports and bulletins. I think that there have been a great many mistakes made in the kind of literature that has been put before the farmer. We are trying an experiment at Geneva which so far promises good results. We have stopped issuing to the farmers the complete bulletins that contain all the data which are the results of our investigations. I believe as a rule there have been too many figures, too many data and too elaborate statements of facts made to the farmers in conveying the conclusions reached. The farmers have been swamped. They are not technical investigators, and it is as hard for them to understand some things we put out as it is for some of us to comprehend certain sermons we hear that are phrased in the technical language of theology. At Geneva we have employed a station editor whose chief duty is to take these complete bulletins and write them into a briefer form. There is no use in presenting to farmers things too indigestible and too hard to understand, and I have great faith in the outcome of this attempt. While these experiment stations are touching the business of agriculture profoundly, to my mind the money benefit is not the important one. The possible uplifting of the man is vastly more important. Humanity does not exist simply to till farms or to make money. When I look abroad in the land and see how completely our legislation is taken up with money problems, and how we ignore great moral questions and issues that ought to go to the front, I am sometimes discouraged. I have been afraid at times that our young men, who enter college to fit themselves for business, exaggerate the money side of life. Their first object should be to build up their manhood. (Applause). And if somehow this scientific movement as it spreads into the life and the homes of the farming communities does not reach our manhood and womanhood I shall feel as though we have missed the best part. Man does not exist because of the farm, but the farm exists because of the man. Do not bow down before your farm as an idol and offer up to it constant sacrifices of hard work and intense toil, and forget yourself and your family. My friends, this common people to whom I belong and to whom you belong, is the seed bed of national character, and what we sow springs up and determines what we shall be as a nation. If we sow ignorance we reap ignorance. If we sow corruption we reap corruption. If we sow truth and high principles we shall reap these things that are ideal. This science movement should elevate the thought, the aspirations, the ideals of every home. I would not forget the mother side and the daughter side of the home. Home life demands as large a knowledge of the material world and of the forces that effect human life and human welfare as does the farm life. The wife has the care and keeping of the children. She must feed them and she should know how best to do it. I do not know what you are doing here in the Dominion. Across the line we have High Schools and Women's Colleges, and what are they doing? Why they teach literature, philosophy, languages and mathematics, which is right. The sciences still take a second-

ary place. Some of the girl graduates know a little French, German and mathematics, but what do they know about themselves as women? (Applause). What do they know about the foods they put on the table every day? What do they know about all those varied physical forces, the use of which determines the welfare of the family. Now, I would that somehow this science movement that is touching the farm life should touch the home life, and that in the Dominion and in the United States, schools and colleges should recognize this demand for a more rational education of the girls. Mary comes out of her school now beautiful and attractive. We are proud of her, the young men are proud of her and some one of them asks the old question, "Mary, will you?" and she answers "Yes." (Applause and laughter). A new home arises. God bless it. And then there follows that which is the completion of every family—the children. These children are in the hands of the mother as they never can be in the hands of the father. Now, does not she demand knowledge? Does not she need wisdom? What will her Shakespeare amount to except to cultivate sentiment in the child? What will her French avail? She will forget so much of it she cannot teach the daughter when she comes to study the language, but if she knows the facts and forces that determine human life and its physical welfare, she will raise up for the State strong sons and robust daughters to take their places in other homes and in building up the welfare of the nation. My friends, I am very grateful to you for your kind attention this evening. (Loud applause.)

The CHAIRMAN: I am sure that you agree with me in congratulating Prof. Jordan for the very able address he has given us. It has been practical from start to finish, and I know that you all feel as I do that we are greatly indebted to him for the very able address he has given us. Between the professors of the agricultural colleges on the one side and the progressive farmer on the other there used to be considerable antipathy, but now there is not so much divergence of opinion as there used to be. The average farmer that is here to take part and to criticize the professor has less to say as the years go by. The hard-working farmer and the hard-working professor are getting nearer together.

CANADIAN CHEESE AND BACON IN GREAT BRITAIN.

By HON. SYDNEY FISHER, MINISTER OF AGRICULTURE FOR THE DOMINION OF CANADA.

I want to express my thanks to the Western Dairymen's Association for their kind invitation to me, to once more take part in their annual convention. Last week I was fortunate enough to pay a visit to the Eastern Dairymen's Association in their meeting at Kingston, and, as is usual with me when I meet face to face with the farmers of Ontario, I am able to go away having derived a lot of valuable information that is of value to me in the administration of my Department. I was much struck by some of the sentiments expressed by Prof. Jordan. I feel many of the influences that come to him in the experiment work in the States are equally true in the work of Canada. We can learn some lessons from that speech which will help us in our experiment work here. It is very true, indeed, that this experiment work is one which requires the sole and undivided attention of men who are engaged in it, and I must plead with you, representative farmers of Ontario, not to call upon the experimenters of our country to come before you too often and address you at public meetings. It is hardly fair to them in their work and it is not necessary, because fortunately now in Canada, as in the United States, we have a large staff of well informed men, well educated, well equipped, who are able to go before the public audiences of our country and explain to the farmers, who come in such large crowds to these meetings, the results to be obtained from experiment work in the experiment stations and experiment fields. Therefore, I think it is quite time that we should begin to take to heart the idea that is put before you by Prof. Jordan, and try to relieve the experimenters from the other part of the work which is now so incessantly called from them. I am addressing an audience of dairymen, and I want to speak of the dairymen of Canada. I am not for a moment intending to go into the details of the work. I am

myself a dairyman; it has been that part of the farm which has always been my own particular study and care, and I think I know some little about the details of butter-making. But in an audience such as this, and with professors and men who are specially engaged in the working out of the scientific problems connected with this business of dairying, I am not going to detain you with any observations or ideas of mine upon the details. At present, as a Minister of Agriculture in the Dominion, it is my duty to study the proper questions of agriculture throughout the whole length and breadth of the country; therefore I want to deal with this particular branch of agriculture from that standpoint.

You have again and again been told by your speakers about the magnificent export of cheese from Canada to the Old Country. In the year that has just passed it reached seventeen million and a half dollars. The size and quality and excellence of this trade is largely due to the work of your and kindred dairy associations of this country. It was in this western part of Ontario that this magnificent trade took its origin. It was not stimulated by Government aid. It was started by enterprising men, and carried on to perfection by these same men—aided and helped by some expenditure of public money, but at the same time due to the enterprising intelligence and skill of the men engaged in it; and it is a matter of satisfaction and pride to me as a Canadian farmer to know, that the one thing in which Canada leads the world is the cheese trade—a trade which is managed, and which had its foundation laid, by the farmers of the country. It was my duty this summer to go over to England to see what I could find out with regard to the markets of that old land for our Canadian agricultural products. And there I was startled almost at once, by assertions and statements which I could hardly credit.

It has been said we have been bragging about our cheese trade. For the first time in many years I heard criticisms on the quality of Canadian cheese. And I found a fact which startled me, that the cheese that was made in the old land, in the best parts of Scotland and in England, was selling at a price considerably in advance of the best Canadian cheese, and what was worse it was deserving that price because it was better. These are startling statements to make in the face of the Western Dairymen's Association, the men who have founded that cheese trade, but I fear the cheesemakers have been resting on their oars and their reputation, and not paying just that attention which was necessary to the progress and advancement of their business which others have been doing. We in Canada have been sending instructors to Scotland, New Zealand and Australia, and I believe even in the United States some Canadian dairymen are working to-day. Now, let us see what it is that is at fault with us, that has caused this little criticism of our cheese. What was that criticism? It was that the Canadian cheese seems to have been a little heated between the period of manufacture and its arrival in the market—I mean the initial stages of its manufacture. Some of that heating was probably done in the factories and not altogether on the trains. Some cheese has been sent from the factories too young. When discussing this matter in England with Prof. Robertson, who was with me, I was told more particularly of the experiment which was made last year and the year before by Prof. Robertson and Prof. Dean of Guelph, in regard to the quality of cheese kept in the curing-room where the temperature was regular, and cheese cured in the room which was so constructed that the temperature varied according to the temperature of the air outside. And when I came to find out that in one case the cheese was perfect in texture, quality and flavor, and in the other case the defects could be detected from the overheating in the curing-room, we could lay our hands on the very spot and the foundation of that criticism which was levelled at our cheese this summer in England. What should first be done by the cheesemakers of Canada is to see that their curing-rooms are so constructed that the temperature will be uniform and they should have such a store of ice that they could keep the temperature always below 65 degrees Fahrenheit. That must be done if we wish to hold that position in the English market which we have held in the past. Then we will have to see that our cheese does not leave the factory until it is properly cured. A couple of years ago for the purpose of protecting our butter trade I took upon myself to arrange for a system of cold storage cars for the carrying of butter, and I venture to say that I will have to

do something in the same direction in order to have our cheese carried in better cars than it has been in the past. (Applause.) Believing also that there was some injury to cheese in the closed up, carefully battened holds in the great vessels that cross the Atlantic in the summer months, I went, when I was in England, to the chief owners and managers of the great steamship lines, and with Prof. Robertson again to help me, we pointed out to these men that the vessels which carried our cheese across the Atlantic should have their holds in which the cheese is placed properly ventilated, and that it was a simple, easy and inexpensive thing for them to put in their vessels an equipment of electric fans and ventilating shalts so that the heat could always be passed off by raising up fresh and cool air in these holds. These gentlemen said that they were quite willing, and would immediately take the steps that were necessary to accomplish this change, and as a result I found this fall, within a month or two of the time these representations were made to them, a large number of the vessels that left Montreal were fitted up with these conveniences, and I venture to say in the coming summer those vessels which leave the port of Montreal to carry cheese to England will be so fitted, and I trust that in this way we will be able to overcome this slight slur which has been cast on our cheese trade, for, I think, the first time in many years. And if cheesemakers and patrons will take hold with the same enterprise and spirit which they have in the past I have no doubt whatever that the Canadian dairymen will be able to maintain the proud position which they now hold in the British market. (Applause.)

I want now to say a few words about the butter trade. For a long time back—ever since we have had creameries at all—we have been making in Canada just as good butter as anybody in the world has made. Neither the Danes, the Irish, the Australians, the French, nor anybody else, has made any better quality of butter. At the time that butter left the factory it was of an extra good quality, but in consequence of the long journey, and of the inadequate facilities for transporting that product—when the Canadian product reached the English market it did not command as good a price as it should. As a matter of fact, four years ago, and four years before that, Canadian butter sold in the English market for twenty shillings less than the best Danish, and ranged from five to ten shillings a hundred weight below Australian. This summer, when I was over there, our Canadian butter ranked up very close, hardly five or six shillings below the best Danish, and in many cases exactly on a level with the best butter in the English market. It ranged up high through the season to five or six shillings above the Australian butter, where four years ago it had been that much below. What is the reason of this? I do not think it is because our butter is any better to day that it was four years ago. We are no doubt making progress and are daily acquiring knowledge in regard to the manufacture of our butter, and I have no hesitation in saying that in that branch of our interests we have been keeping pace with the progress of the world; but at the same time I do not think that we have been making greater progress in the manufacture of the butter than our neighbors have been doing. We have, however, made our great change, and that is, we have provided a systematic and continuous chain of cold storage from the creameries in Canada to the steamers, from the steamers to the counter in England, so that our butter from the day of its manufacture till it reaches the counter in England need never go above 35 degrees Fahrenheit, and the result is what I have already told you—that is the abundant and complete reward for the expenditure of the funds for which I asked Parliament, for the power and control to carry it out.

There is one other point that I wish to speak of, our export of cheese to England has about reached its maximum. I do not mean by that to say that we send too much cheese to England. I do not mean to say that as years go on there will not be room for a little more Canadian cheese in the English market, provided we keep up to the highest point of excellence, but the position of affairs in the English market is such that I do not look forward with any hope to a much increased trade in that particular product. Now this does not mean for a moment that we are going to leave the cheese trade. We are not. We are increasing the yield of milk in Canada all the time. Prof. James pointed out to me that at a certain part of the season when the grass was good we made an enormous

amount of extra cheese. This is liable to occur again, and in addition to that we are every year adding to the number of cows we keep and adding to the number of men and women engaged in the dairy interests.

What are we going to do with the milk? I venture to say it would be deplorable to our cheese trade if we were to go on cramming that amount of milk into the cheese trade. We would very soon crowd and glut the cheese market, which would lower the price of all the cheese on the English market as well as our own. The English consumer of our chees has been the working man. He took the Canadian Cheddar cheese and used it for food, not for a dainty to nibble at, but took it by the quarter and half pound and ate it for his dinner. That man is better off to-day than he was ten years ago. If there is one thing more noticeable than another in visiting the old land, it is that the people there are prosperous and rich. The old land from which we have all sprung is still strong and vigorous. (Applause.) The heart of the Empire is teeming with wealth and industry. England has so much money that she hardly knows what to do with it. And the laboring man in England is getting so that he is well off, and he wants to live better and richer than he used to do, and instead of eating cheese to his bread he is beginning to demand meat, and he is getting it and paying for it, and in the future the men who used to eat our cheese—a very considerable number—will eat less and a great deal more bacon. This might be a little disparaging for the man engaged in the cheese trade, but it is a fortunate thing for us dairymen that we have not only one string to our bow, but we have the adjunct of making bacon as well, and we can supply that increasing demand in the old country for bacon, and we can give them a good quality of that article. I found Canadian butter had reached a high point in the English market, and also Canadian bacon. Everywhere I heard the one story, "Your Canadian bacon is as good as anything that comes to England. It is all right; if you would only send us more of it." (Applause.) Now, if we dairymen are going on to make the most out of our business, we must add to the manufacture of butter and cheese the manufacture of bacon and hams. What are the facts? Two years ago we sent four million dollars' worth of hams and bacon to the old country. In the fiscal year that ended 39th January last, we sent over eight million dollars' worth of bacon and hams to England, and I venture to say that if we look after that business, as we have been looking after it, and continue to make the same quality of bacon we are making to-day, that within another two years we will be sending as much bacon as we are sending cheese to-day. In other words we will double the quantity again, and in two years from now we will be sending to England sixteen or eighteen million dollars' worth of bacon as well as seventeen million dollars' worth of cheese. (Applause.)

We have the opportunity; we have the ball at our feet; we have the trade in our hands; we have only to extend it. Let us take advantage of what is before us, and we can do that by keeping up the excellent quality of our products. If there is one thing more than another which is characteristic of the English market it is the absolute requirement of the best quality. Wherever I saw the price marked in a grocery or in the market, the highest quality was marked with a good paying price, the second, third and fourth qualities were down—the glut of the market. Let us then see to it that our production of cheese and butter and bacon, which goes to the English market, only enter into that first class and commands that first price, and then we will reap the profit which will bring prosperity to ourselves and make our country all over smile with the results of our business. (Applause.)

I am glad to come before an audience of the dairymen of this country and tell them what little I learn about these things as Minister of Agriculture. I know well the courage of the people of this country. I know that they are not going to shrink from the duty before them, and it is better to recognize strongly and fully the duties that have to be attended to so that they may be the better overcome, and I trust with confidence to the intelligeuce and interests of the people engaged in this business to overcome any obstacle in that course of success which has characterised them in the past.

The CHAIRMAN: I would like to say something after the Minister of Agriculture, but as the hour is getting late I will refrain. However, I may say, I do not take the same view as he does about the cheese business. I think the cheese business is all right, and will continue in that condition. (Applause.)

Eloquent and able addresses were then delivered by Mr. C. L. McKay, Iowa State Dairy Instructor, Iowa, and by Dr. Beardshear, A.M., LL.D., President of the Iowa State College of Agriculture and Mechanic Arts.

BACTERIAL INFECTION OF CHEESE.

Dr. CONNELL, Pathologist, of Queen's University, Kingston, then read a paper upon the above subject, which will be found in the report of the proceedings of the Eastern Association. (See page 33.)

A VISITOR FROM EASTERN ONTARIO.

Mr. D. DERBYSHIRE, President of the Cheese and Butter Association, was introduced, and after complimenting the gathering upon the success of the Convention, he went on to say: I bring from the eastern brethren greetings to our fellow laborers in this great cause. We are struggling together to better the condition of our fellow countrymen, and I must say that I feel very proud of the work that has been done, not only in the eastern section, but also in the western section of the Province in the improvement of our dairy business. The Minister of Agriculture seemed to be a little fearful with regard to the cheese business. In the early history of the cheese business we had a few who were called cranks at that time, who had to put their hands into their pockets and send a man to Great Britain to find out something of the requirements of the trade. He found out that they wanted a finer quality of cheese, and they at once set to work to make that style of cheese, and you now know the result. We went on from one step to another until we captured the markets of the world and furnished 65 per cent. of the cheese bought in the English market. I think this is something to boast about. At Chicago we carried off 95 per cent. of the prizes, and it was only as a matter of pity on the part of the judges that they gave the other fellows any prize at all. (Applause). And do you think that the cheesemakers of this country and the people of this country are going to stand up and let anybody walk ahead of them in regard to the making of cheese? I think not. We are delighted that the Minister went to the old country this year and looked into the requirements of that market. We are glad that he found there some improvements that can be made; because we meet in these conventions for the purpose of finding out the requirements of the trade, and then to set to work to make these improvements. He says our cheese are heated, and I believe he told the truth. I believe a great many cheese have been heated before they left the factory. I believe a great many of our factories are not properly equipped for making fancy cheese, and the address of the Minister of Agriculture was the very thing we wanted to set us earnestly to work right at it. Go right home and put every one of our factories in first-class condition. A great many will say this is going to cost some money. I am prepared to tell you to-day, if you fit a factory up properly, that in this year of 1899 you can save in the loss of weight and shrinkage of the cheese, if you erect a proper curing room, one in which you can control the temperature, you can save every dollar that you put out, and more too. It is an easy matter to strip up one of our factories and put on two thicknesses of paper, and put tongued and grooved lumber, and that even in ordinary factories. I think in the interest of our business that we ought to put our factories in first-class condition on the outside. We should clapboard and paint them, make them look respectable, because the cheese factory is the centre of the educacation for the district in which it is located, and we should take pride in the one business that has stayed so well by us in the past. Our cheese were all right in the British market as long as they did not make any finer cheese over there; but with their cool climate and experts they have got from our own country, to educate them, they have been making

this year a better cheese than some of the cheese made here—not better than the best of our cheese, but better than quite a quantity of our cheese. Another thing that delighted us in Mr. Fisher's address is that he is going to bring before the railway officials the advisability of putting on proper cars for carrying our cheese. We must have better cars, so that we can control the temperature in the car in order that the cheese may be shipped in perfect condition; and we should have clean wagons to take this cheese from the factory to the station. I believe there will be no doubt about bringing all these improvements to pass if we only go to work in a proper way to do it. Now, we got so enthusiastic about it in the east that all our boards of trade are going to have meetings. We were at one meeting Monday night in Sterling in connection with the board of trade. We want a uniform article from one end of our country to the other. There are a great many makers who have not the ability or the energy to carry on this work successfully. We have now in the east a great many very poor makers, and we are doing our best to weed them out. It is a great mistake for a factory to let a first-class man go and take in his place one who will work a little cheaper, and in the end cost you thousands of dollars and destroy your reputation. There is no trouble about a maker being qualified. We have our dairy schools, and I hope the day will soon come when a man will not be allowed to conduct a factory until he has a certificate from one of these schools. It will not answer for us to sit down and fold our arms and say we have got the reputation. The cheese maker should educate the people in the section as to the feeding of cows and the caring for the milk. He should be an educated man and up to date in every respect, and in order to get that style of man you will have to give him better pay.

In the first place we want better men at home in the factory, men who will watch the poor cows and get rid of them, and get their milk to the factory in better condition and in large quantities. We want factories fitted up so as to receive these new products. We want the best man in charge of that factory, so as to make the best quality of goods. Then we want to have improved facilities so as to get this cheese from the factory to the station, and improved facilities on the railway which Mr. Fisher has already promised to secure for us. And we have also been promised refrigerators in the ships. If we have all these things we are bound to advance during the present year.

As regards aeration of milk, the best we have been able to do has been with a long handled dipper dipping to the bottom of the can and raising it up, and then once in a while taking that dipper and giving the milk a stir. In one of our dairies in Brockville, one man made $61 per cow for the milk furnished in six months, and there was another patron in that same factory who had only $14 from his cow. We have a meeting in connection with our factory every year, and we put on the blackboard the name of every solitary patron, showing how many cows and how much he has furnished per cow, and showing him the net result of his business, and that has had the result of rubbing the people together and brightening them up. You know in some of the foundries they take the rough castings and put them in a large roller and then revolve it which rubs them together and brightens them; and we think by rubbing the patrons together in this way it would brighten up their intellects and sharpen their wits, and the result is they get better results.

Mr. McPherson: How did the $61 man feed his cows?

Mr. Derbyshire: He turned them out in the pasture at night in the hot weather and fed them in the stable during the day, and they were kept in well ventilated stables where they could lie on clean straw and would be cool. The windows were screened so that flies could not enter to bother them, and that same man produced milk cheaper than the man who only received $14 per cow. In our section we feed corn, and we have three silos. We have one silo that we open as soon as the cows are put in the stable in the fall, and we feed them during the winter not too solid, say 40 pounds in the morning and 40 pounds at night, and at noon we give them a little clover hay that was cut when it was green. We also give them some peas and oats.

The Chairman: We have been very much interested in Mr. Derbyshire's address, and we reciprocate the kind greeting he has brought us from our brethren in the east. We are working shoulder to shoulder to uplift the dairy industry.

FECAL BACTERIA AND THEIR RELATION TO MILK AND CHEESE.

By Prof. F. C. Harrison, Ontario Agricultural College, Guelph.

What They Are: The bacteria which are found in the manure of animals, birds and man are very indescribable forms from a cheesemaker's standpoint.

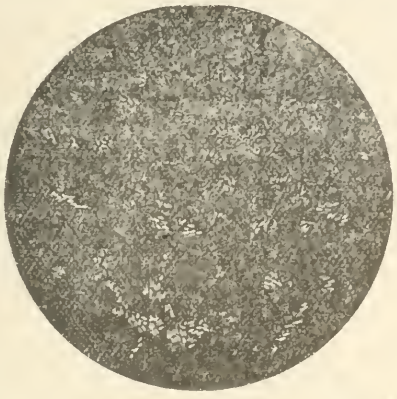

Fig. 1. The Colon Bacillus.

To characterize the commonest organism that is found—the colon bacillus—we may state that it is rod-like in shape (Fig. 1) and about $\frac{1}{25000}$ of an inch long; in solutions containing proper food and sugar, it decomposes the latter and forms gas; this gas may also be formed in milk.

Fig. 2.

Fig. 3.

Fig. 4.

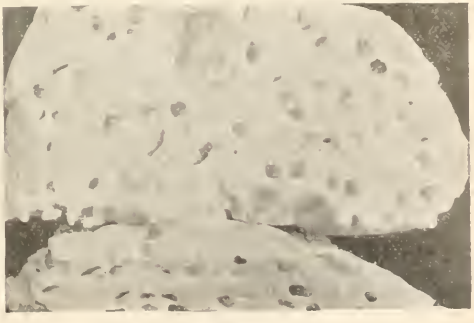

Fig. 5.

Figs. 2, 3, 4, 5. Small pieces of curd from milk inoculated with gas-producing germs found in water used by 4 different factories.

How they Gain Admittance to the Milk and Cheese: Dried particles of manure contain many of these germs, and the air currents in the barn carry these particles full of germ life into the milk. During milking many germs are dislodged from the dried mass on the cow by the movements of the milker and drop into the pail, where they find excellent conditions for growth and development. If milk cans are left uncovered in the barn, fresh infections will usually result. On the road to the factory, some of these fecal germs may gain admission to the cans by way of the ventilating hole. Road dust contains large numbers of colon bacillus.

In the factory fresh infection may take place through unsanitary surroundings, bad drainage, etc, and by means of water. Water very frequently contains the colon bacillus (and many varieties of it) in large numbers. I have isolated it from the water used in a number of cheese factories. Hence it may find its way into the milk:

1. By way of improperly scalded vats or utensils.

2. By the water used for diluting the rennet and setting the vats.

The effect of the Colon Bacillus and varieties of it on the milk and cheese. —The evil effects of the growth of bacillus in milk and cheese are manifested in a number of different ways:

1. By causing gassy curd and consequently bad flavored curd. This is a trouble which cheesemakers have constantly to deal with. Great care should be exercised by patrons keeping cows and stables clean, and by cheesemakers in seeing that the water they are using is of good quality and free from these gas-producing germs In figures 2, 3, 4, 5, may be seen photographs of gassy curd formed by germs isolated from the water sent to me from several provincial cheese factories.

2. These gas-producing germs, by their multiplication in the cheese after it is put in the press, may cause it to swell or "huff," producing distortion of shape and bad flavor.

3. The investigations of Lloyd in England have shown that the hydrogen gas formed from the colon bacillus exerts a bleaching action on the cheese color, causing mottling or discoloration in cheese, which much depreciates its market value.

How to get rid of them: It may not be possible to prevent the colon bacillus and its varieties from gaining access to the milk, but much may be done to prevent serious contamination by strict observance of the following rules:

1. Keep all cows thoroughly clean and well groomed, especially the udder and flanks.

2. Brush the udder and moisten the hairs on it with a damp cloth before milking and this prevents the germs from dropping into the pail, as they cannot leave a moist surface.

3. Do not feed dusty fodders during milking.

4. Remove the milk from the barn immediately after milking.

5. Keep the cans which are sent to the factory covered with a damp white cloth.

6. Keep the vats and utensils used in the factory well cleansed, using live steam as the last cleansing agent.

7. Keep the well absolutely clean, and find out if the water used in the factory is free from undesirable germs, such as the colon bacillus.

Mr. T. G. Bell, of Hastings: Would it be advisable to send a sample of the water that we use in the cheese factory to the laboratory?

Prof. Harrison: In any case where you think you have any trouble with the water we shall be pleased to make an analysis.

Mr. Derbyshire: I think it would be a good thing for the maker to mail a sample of water to the laboratory at Guelph. It would do no harm, and I think it would be only fair to the factory men as well as to laboratory to give them an opportunity of analysing the water and seeing if it is all right.

IMPROVED CURING-ROOMS.

By Prof. H. H. Dean, Ontario Agricultural College, Guelph.

The importance of having cheese well cured has already been sufficiently dealt with, so that I need not waste any time in talking upon that point. On the 11th of May we undertook to make some changes in the curing-room in connection with the dairy department of the College. The changes were as follows: We divided the room into three compartments, and connected these compartments with a sub-earth air duct, as it is commonly called. We had for our object the curing of cheese at different temperatures and at different percentages of moisture, to see what the effect would be. Now, I shall first describe how we make the sub-earth duct, and shall speak on the result of our experiment. I shall put the matter before you as concisely as possible. The duct is about ninety feet long, six feet deep at one end and six and a half feet deep at the other, to allow for drainage. In the trench were placed six rows of 6-inch drain tile. Three rows were placed in the bottom and three rows directly on top of these, breaking the joints four inches. On the top of the tile was placed eight or ten inches of shavings, and then the dirt was filled in. At each end of the duct was placed a curb about three feet square. These curbs fit over the top of the tile in such a manner as to prevent the dirt from entering the tile. At the inlet end of the duct is a galvanized iron pipe thirty feet high and fourteen inches in diameter. On the top of the pipe is a hood or cowl, which turns towards the wind at all times. A constant stream of air enters the pipe and passes through the tile on its way to the curing-room, and it becomes cooled about twenty degrees. The inlet of air in the curing-room is regulated by means of slides. The warm air is taken from the room through a ventilating shaft, which passes from the ceiling to the roof, and there connects with the galvanized iron pipe which is twelve inches in diameter and fifteen feet in height from the roof. The top of the pipe is covered with a cap to prevent rain entering the room. The inlet for the air should be at one side of the room and the outlet at the opposite side, so as to change all the air in the room. The total cost for a duct was about $65 for a small room. For an ordinary curing room the duct should be 150 to 200 feet long and from eight to twelve feet deep, if at all possible, as this furnishes a supply of cooler air than a shorter and shallower duct.

Before, or at the same time as the duct is being built, the curing-room should be insulated by lining the room with two-ply of building paper, then nail on the two inch strips, and then nail a lining of matched lumber. The floors, walls and ceiling should all be lined, though it will not be necessary to put the two inch strips on the floor. The results of experiments made at the Dairy department of the College indicate that there is a marked improvement in the quality of the cheese cured at an even temperature of sixty degrees to sixty-five degrees. One expert who examined the cheese said there was a difference of one-half to one cent per pound in favor of the cheese cured at sixty degrees to sixty-five degrees as compared with similar cheese cured at sixty-nine degrees. In a factory making 100 tons of cheese, assuming that an increase of one-quarter cent per pound of cheese were obtained, the increase value of the 100 tons would be $500. The increased loss of shrinkage by curing cheese at the high temperature was over one per cent. as compared with curing at the low temperature. An increase of one per cent. of cheese on a make of 100 tons would be 2,000 pounds, which, valued at eight cents per pound, would mean an increased value of $160. On the assumptions here made that 100-ton factory may increase its returns by $660, which would in one year more than pay for all the expense of putting the curing room in first class condition. In addition, the reputation and quality of Canadian cheese would be enhanced considerably, and the present is a critical stage of the Canadian cheese industry, as pointed out by the Minister of Agriculture last evening. By having properly constructed curing rooms, suitable cool cars, and proper transportation on steamships, Canadians might easily recover the ground lost or apparently lost during the season of 1898. The main thing to be done is to interest every person who owns or has an interest in a cheese factory to put the curing room in

thorough repair early in the season of 1899. The expense should not prevent any one from doing so, as the returns in one year would, in all probability, more than repay the slight cost of construction at the beginning. If you build a sub-earth duct I would have the inlet at one end of the room and the outlet at the other, so as to have a current right across the room. For ordinary factory work I would recommend building the duct from 150 to 200 feet long and putting it as deep as you can get it. We found the air was moist coming in from the sub-air duct and gave us trouble with mould on the cheese. That was the only trouble we had. I have here a maximum and minimum thermometer. We have some expensive instruments, costing us $8. This one which I hold in my hand cost ninety cents, and it is marked "Made in Germany." You see it is simply of a "U" shape with the mercury in the bottom part of the 'U.' Then there are a couple of needles on its side. As the mercury expands it shoves this up and it remains at the highest temperature, since the thermometer was set; at the other side it registers the lowest temperature. We set this thermometer every morning about eight o'clock. The average maker when he goes into his curing room looks at his thermometer and he sees the temperature; but it may have been lower or higher than when he sees it. This instrument shows the lowest and highest temperature since he set the thermometer. This thermometer gives just as good results as a more expensive one, but I advise you when you go to buy one of those to take a tested thermometer with you, and then select from the one which the dealer shows you—one that corresponds closest with your tested thermometer.

Now a word about the moisture in the curing-room. It is important that the cheesemaker should know what percentage of moisture there is in the curing room. We have at the present time some experiments in progress to see the effects of the moisture alone, keeping the temperature the same as near as possible. The ordinary hygrometer—that is a dry and wet bulb thermometer—costs $6.50. A polymeter costs $8 or $9, and, as far as our experience goes, the polymeter is not a satisfactory instrument for registering the moisture in the curing room. But any cheesemaker can make a hygrometer by just taking two ordinary dairy thermometers that register alike and at the bottom of one put a piece of lamp-wick about a foot long and double it. Put the two ends over the bulb of the thermometer and wrap it with a piece of string or sew it on with thread. Get a cup or glass and put it in some condensed steam. This is the purest water you can get. Put that into a cup and put your lamp-wick into this water and place it on the curing room shelf, having the top of your cup higher than the bottom of your bulb, and right opposite that have your ordinary thermometer. When you want to know what percentage of moisture there is in the curing-room, read first your dry bulb thermometer and then your wet bulb thermometer. In some cases it is advisable to fan the thermometer before taking the temperature, then from the chart you will be able to tell exactly the moisture in your room. I have here a brief table, and by making a calculation from this table you will be able to tell the amount of moisture in the curing-room by using one of these home-made hygrometers.

Dry bulb thermometer.	Difference between dry and wet bulb thermometers. Degrees.	Per cent. moisture.
55	0	100
55	1	93
55	3	81
55	5	67
60	1	93
60	3	83
60	5	70
65	1	94
65	3	84
65	5	73
70	1	94
70	3	85
70	5	74
75	1	95
75	3	86
75	5	75

First have the curing-room properly insulated, then either get a sub-air duct or use ice; then be sure to keep the temperature even at 60° or 65°.

In cold weather it is necessary to keep the temperature up by use of a furnace. Aim to get an even temperature in the curing-room, and we shall see as a result a marked improvement in the quality of our cheese. This is a very important factor in getting over this heated condition of the cheese, and any person who has anything to do with the factory should make special effort to gain control of the temperature in the curing-room in 1899.

ICE IN CHEESE FACTORIES.

By A. T. Bell, Tavistock.

I am sure we have all listened with pleasure to Professor Dean's address. I think the time has come when we will have to provide means for putting in either sub-earth air ducts or ice for keeping our cheese cool. Last August some of us had sleepless nights over the hot weather, and I think all the energy and lost vitality would have built an ice-house and filled it with ice. I did not know my name was on the programme till last night, and have not anything specially prepared, but I will describe an ice-box we used last summer which seemed to answer our purpose very well.

In the first place we had galvanized iron pans made 3 feet square, and in the centre of that we put a nipple attached with jam nuts, one on the top and one on the bottom and soldered at the top, and we had that nipple long enough to go through the floor and to conduct the waste water, with a return elbow fastened on the lower end. In that pan we had a rack 2 feet 10 inches square. This rack was made by using 2x4 scantling dressed, 4 strips in the bottom and 2x2's nailed on the top of them, 2 inches apart. That made it 6 inches high. I found that was hardly high enough, I preferred having it 2x4. Then we had a box made 6 feet high, a close board box made of matched pine lumber that raised it to 6½ or 7 feet. We had no ice ourselves but we procured it from the village, and we filled the box in the very hot weather in August. We placed the ice in box when the temperature was 78° in the curing room, and I placed the thermometer just where you could feel the cool air coming up, and it went down to 52°. That was a great difference—from 52° to 78°. I could not get any more ice in the village, and I sent to Stratford and got more, and at that time it registered 20° difference from the registration we usually had. I noticed when we got the ice-box filled there was a far stronger current, and I think it would be a good idea to keep the box well filled. We could feel the cold air for 2½ feet away from the ice-box. I am satisfied that will answer our purpose if we have the curing-rooms well insulated. I was well pleased to hear Professor Dean on the sub-earth duct, but this ice-box costs very little, just a few dollars, and as we are running our business winter and summer we will all have to provide ice for the butter, and we could put in a little extra for our cheese; it is going to give satisfaction. We might probably have to put in two ice-boxes in a very hot term. Our room got heated up to 78° before we got in the ice-box, and you all know it is pretty hard to lower the temperature when the cheese gets heated; and I am satisfied that if we put in ice in time we can keep the temperature down. It is almost impossible to reduce it with one box.

Mr. Derbyshire: Professor Dean in his address showed us the cost of the sub-earth duct, but he did not show us the profit we were going to make in the shrinkage in a room that had a proper temperature and one that had an old-fashioned temperature, and I would like to have that brought out at this time.

Prof. DEAN: I always prefer to have the people take hold of these things without mentioning the question of dollars and cents. I have prepared some figures on that question. Take a one hundred-ton factory, and if they were to improve the quality of cheese so as to get ¼ cent per pound more, that would mean $500. On a fifty-ton factory it would be $250, and that would pay all expenses in connection with the insulation, and put in the earth-duct or ice-box. There is one other question, namely, increased weight of cheese. You will notice on the charts there was a difference of about one per cent. If you could save one pound of cheese on every hundred, on 200,000 pounds or 100 tons, with cheese at 8 cents per pound, that would mean $160 saved, or the loss of shrinkage alone, so taking it, would be $600. It would be a pretty hard matter to prove that practically, but just take these figures as you find them. Supposing you make a difference of ¼ of a cent per lb. on the value, and save one pound per hundred on the shrinkage, there would be on the hundred-ton factory a saving of $660.

Mr. DERBYSHIRE: We had a test, and the difference in the cheese when weighed in a poor curing-room and a first class curing-room was 1½ pounds a box, but calling it one pound a box at 8 cents a pound, would give you over $200, so there is money in having a proper curing-room.

Mr. ADERHOLD, Wisconsin: I am very glad to be with you, and I feel that when I go home I shall take something with me, and that when I cross the border I will not feel it my duty to pay duty on it. (Laughter). Now, we have not been asleep in the United States, and while we admit that the Canadian cheesemakers are our superiors I am glad to say that we can teach them a few things. For example, out of 45 factories which I visited in the past season 19 paid for milk on the fat basis. We have makers who clean their whey tanks every day, removing all the whey; clean the tanks and heat the whey to 150 degrees when it is put in the tank; and I want to say I do not believe there is any danger in returning the whey in the cans. I do not believe there is any danger. As to curing-rooms we have sub-earth ducts that I believe are better than you have here. We have some that are 10, 11 and 12 feet deep, and we find that they save a shrinkage from 2 to 2½ per cent. of the total weight of the cheese. I believe that by using a sub-earth duct you can increase the value of the product at least 5 per cent. during the summer. We have a sub-earth system—a ventilated curing-room by the use of a well. In one factory the well is 40 feet from the surface, and we can get ventilation when you cannot feel a breath of air on the ground; this lets the air into the well and then there is another pipe leading from the bottom, just above the water, that brings the air into the curing-room. The curing-rooms are well insulated—good walls, double windows and double doors. I was in this factory on the 15th day of August, and on that day the air in the room was at a temperature of 55 degrees. Another system I find in our factories is that the cheesemakers have along the side of the curing-room a room full of ice, so that the air could circulate round it and under it. There are two small openings at the bottom that let the air into the curing-room. That is automatic ventilation, and the room will not get too warm. The whey problem deserves more consideration than it usually gets. If you take fresh clean whey, you find it has considerable feeding value, and there ought to be some system for distributing this whey properly, so that a man will not get more than his share. I remember one case where a cheesemaker had a device of his own to prevent the patrons taking more than their share, and when he found the patron was pumping too much he pulled a wire and the whey would leak out into the tank instead of into the cans. The patron would ask what was the matter with the pump and he would tell them the sucker was on the wrong end of it. (Laughter).

THE PRESENT STATUS OF FEEDING, VALUATIONS AND STANDARDS.

By W. H. Jordan, Geneva Lake, N.Y.

Humanity is constantly busy drawing conclusions. Every day some new situation, some unprecedented combination of circumstances, faces us, and we must, after careful consideration, form a judgment as to the proper course of action. Many of us would be glad to avoid all this trouble and perplexity. For this reason nothing is more popular than a chart or set of rules that directs us safely and surely to the best outcome of some effort. Whether we till the soil, build a bridge or seek the road to heaven, we are all anxious to discover some infallible guide that, without any suggestion of error, shall lead, us to the object of our desire. Science is often confronted with a demand for a statement of rules and values that under all circumstances are fixed, and much disappointment is often apparently caused when an exponent of science declares his inability to respond to the demand. Many persons have not yet learned the limitations of scientific knowledge, and the chemist or biologist is often criticised, and even derided, because he cannot declare that which is not known even by the wisest.

No class of men have been more insistent in their appeals to science than have dairy men and stock feeders. This may in part be due to the fact that no class of agritulturists are obliged to face problems more intricate or conditions more perplexing. What food is, how it does its work, and what is the relation of food to product, are questions that face them daily. No wonder these men appeal to science. But what a task is set before the chemist and the physiologist!

Agricultural chemists are constantly and persistently interrogated regarding two lines of inquiry, which may be typified by two questions:

1st. What is the relative value of corn meal and cotton-seed meal?

2nd. What is the best ration for milk production?

The majority of agricultural chemists are agreed, I think, that to neither of these questions can a direct unqualified answer be given. Doubtless inquirers are often disappointed at the replies sent from the experiment station, in response to a request for information on these or similar problems Many are the occasions, also, when well informed institute speakers fall short of the expectations of their audiences by declaring that fixed relative values of unlike feeding stuffs cannot be named, and that the best ration must be determined by conditions, such as cost, available food, etc., and that throwing all related conditions aside, a single absolutely ideal ration which is distinctly better than any other possible ration is not known, neither with reference to the kind and proportions of feeding stuffs that enter into it nor with reference to the nutritive ratio. Let us consider for a time the justification that scientific men have for so conservative a position.

Feeding stuffs, like fertilizers, may have both a commercial and an agricultural value. The ruling price of bran is its commercial value, but this may be widely different from its value to a particular farmer for a particular use, which to him would be its nutritive or agricultural value. Now, experiment stations have for many years published relative commercial valuations of the various brands of fertilizers that are in the market. These stations have declared that one ton of Jones' Double and Twisted Crop Lifter should be bought for one sum of money, perhaps $25, and that Smith's Superfine Plant Nourishment should not cost over another sum, perhaps $15. In general these sums of money have fairly represented the commercial value of these two fertilizers, both relatively and absolutely. Why then may not the same method be applied to feeds? A satisfactory answer to this question requires an explanation of the method used in estimating the market values of fertilizers.

The worth of a fertilizer, commercially or otherwise considered, is based upon three ingredients which it may contain, viz: nitrogen, phosphoric acid and potash. Most brands

of fertilizers are superphosphates or mixed goods containing all three of these substances. If then a farmer contemplates buying a mixed fertilizer and is offered one carrying 4 per cent. of nitrogen, 10 per cent. of phosphoric acid and 8 per cent. of potash, and another in which the nitrogen, phosphoric acid and potash are 2½ per cent., 6 per cent., and 12 per cent. respectively, how may he learn what the plant foods in these two mixtures should cost him? It is very evident that if possible he should first of all learn the ruling market cost of these three ingredients, and fortunately he can do this. By consulting the ton price quoted in the reports of certain trade journals, or by securing from reliable dealers a statement of their retail prices for chemicals and raw materials he may ascertain the sums for which he can purchase a ton of nitrate of soda, dried blood, acid phosphate, or potash salts. If, for instance, he must pay $40 for a ton of nitrate of soda whose value is based solely upon its 320 lbs. of nitrogen, then the cost of a pound of nitrogen would be 12½ cents. Acid phosphate is bought wholly for its phosphoric acid, and a ton containing 15 per cent. of this compound costing $12 would furnish it at 4 cents per pound. Muriate of potash is bought simply as a source of potash, and, at $45 per ton, supplies this ingredient at 4½ cts per pound. Knowing then the composition of these mixed fertilizers and the market cost of a pound of each of the substances in them which have commercial value, it is a comparatively simple matter to calculate, approximately, what we should pay for the plant food which they contain. Why are we not able to follow the same course with cattle foods? Simply because existing conditions render it impossible. The dry matter of cattle foods is made up of ash, protein, carbohydrates and fats. We practically ignore the ash and base the value of a given food upon the other three classes of compounds, which are the same in number as the three useful ingredients of mixed fertilizers. If now we could find in the market a cattle food supplying only protein and no carbo hydrates or fats, we could from its content of protein and its market price determine the cost of protein. The same would be true of carbohydrates and fats if they were sold unmixed with other food nutrients. As a rule, however, these classes of nutrients must be bought in a mixed condition. All commercial cattle foods, except, perhaps, one waste product from sugar production, are mixtures in varying proportions of protein, carbohydrates and fats. When we buy one we buy all three. Protein, starch, sugar or oils in their unmixed forms have become, through the necessary processes of separation, too costly to be considered for cattle feeding purposes, and their prices in these forms do not form a proper basis of calculation. If, therefore, a farmer pays $15 for a ton of wheat bran, what proportion of this sum shall he assign to the 320 lbs. of protein, the 1,240 lbs. of carbohydrates or the 84 lbs. of fats? If the price of cotton-seed meal is $25 per ton what share of this amount shall be charged to the 850 lbs of protein?

This problem of the assignment of values to the nutrients of feeding stuffs may be approached in two ways, 1st by attempting to mathematically calculate upon the basis of the prices of standard commercial feeds what is the actual cost of each of the classes of compounds which exist in them in greatly varying proportions; 2nd, by determining the value of the work or function of the several nutrients, and then basing their relative market values upon their physiological importance.

Mathematically considered our problem is complex, and no simple process will solve it. If we were to determine what is the cost of one pound of dry matter through the simple division of the price of a ton of feed by the pounds of dry matter which it contains, and then declare that all forms of dry matter have equal cost, we would get as many prices for protein and starch as there are commercial feeds, with no distinction as to the commercial values of these nutrients. Such a method would be absurd. It would be a bare assumption to declare that all the compounds of a food should have equal market cost.

An attempt was made in Germany, and to some extent in this country, to calculate by the "method of least squares" what should be considered the cost of protein, carbohydrates and fats as based upon the ton prices of a variety of feeding stuffs. Valuations so derived appeared to find favor for a time, and some of our experiment stations, following the lead of German chemists, published pound prices for the three classes of nutrients,

and calculated what commercial cattle foods should cost when valued on a common basis. It was soon found, however, that, mathematically as well as practically, absurd results were obtained. In the first place the prices are greatly influenced by the choice of feeds which shall enter into the calculation. Penny, in New Jersey, using cotton-seed meal, bran, middlings, cob-meal, corn-meal and oats, obtained certain values for the protein, carbohydrates and fats. Hill shows that if he had left out the cob-meal the value for fat would be only half that found and the value of the protein and carbohydrates would be a quarter more. Woll obtained certain pound prices with a list of common feeds, but Hill shows again that if he had left out rye bran these prices would be greatly changed. It appears that varying individual judgments as to the list of feeds that shall determine values may cause absurd differences in the calculated market cost of the nutrients, and introducing into or withdrawing from the list of comparatively unimportant feeding stuffs may lower or raise the price of one nutrient even one-half.

A still more serious difficulty arises from the fact that often, when an apparently typical and proper list of feeds is used from which to calculate prices, the use of the "method of least squares" results in giving a negative value to one of the nutrients. In several cases of this kind the fat was shown to be worth less than nothing, a most absurd conclusion. This mathematical method is, therefore, not available for the valuation of feeding stuffs, and so far as I know no mathematician or scientist has yet offered a similar one that is.

We are left now to inquire whether we may not use physiological values, in other words the work which a nutrient will perform in the animal body, as a starting point from which to calculate market cost. If, for instance, it could be demonstrated that protein has a fixed physiological value twice, and fats three times, that of carbohydrates, it would then be a very simple matter to ascertain what proportion of the cost of a ton of cotton-seed meal should be applied to each class of nutrients. To illustrate, a ton of average cotton-seed meal, contains about 590 lbs of carbohydrates, 860 lbs. of protein and 260 lbs. of fat. If these ingredients are assumed to have a ratio of value of 1, 2 and 3, then the whole would be equivalent to 3090 units of carbohydrates, the cost of one unit of which would be .8 cents, when we pay $25 per ton for the cotton-seed meal. On this basis it would be necessary to assign to the protein a cost of 1.6 cents per pound and to the fat 2.4 cents. If our premise was correct we would calculate the cost of the nutrients in any one of the feeding stuffs, and could either ascertain which was the cheapest source of each ingredient, or by averaging could establish a basis for a general valuation. Unfortunately no such a premise can be correctly formulated. We are not wise enough yet to establish a fixed relative physiological value of the three classes of nutrients.

But, you ask, do we know the heat value of a unit of each of the nutrients, of protein, of starch and of fat? We probably do. These values have been found with a great degree of accuracy by using an apparatus called a calorimeter, and are now being determined from actual experiments with animals. It is more than probable that the energy value of a pound of protein and a pound of starch (carbohydrates) are not greatly different, while a pound of fat yields about $2\frac{1}{4}$ times the energy as heat that protein or starch does. Why then may we not establish the relative value of the nutrients on the basis of their potential energy, which is measured by the heat they produce upon combustion? Simply because foods have other functions beside furnishing motive power to the animal and keeping him warm. They act as building material. The protein and the fat of milk and the body tissues are constructed from the food compounds, and the actual relative value of these compounds for constructive purposes we do not yet know. It is proven, to be sure, that the casein of milk and muscular tissue must have their source in the food protein. We know too that body fat, and unquestionably milk fat, are formed from starch and sugar. Probably both food protein and fat may also act as raw materials in the production of animal fats. While we are reasonably sure of these facts, we have never yet succeeded in actually dertermining the relative fat-producing value of protein,

carbohydrates and vegetable fats. Moreover, we have no data that allows a definite conclusion concerning the comparative money worth of the muscle-forming function of food portein as against the fat-forming function of starch. The man who can speak definitely about this is, I fear, an illustration of the old saw that a little knowledge is a dangerous thing. I see no promising prospect, at present, of being able to compare foods on the basis of their physiological importance as a means of determining what should be the relative market cost.

And now I can imagine you saying to me, is science so important that after all these years it can give no help in the matter of the economical purchase of cattle foods? Doubtless the man who has been an open disbeliever as to the practical value of food chemistry may have been gleaning some comfort from my previous statements, if such a one is here, but it might as well be confessed that scientific knowledge is as yet very incomplete in many directions. Many facts and principles remain to be discovered, and others lie beyond a veil of mystery which finite wisdom may never penetrate. Much of our knowledge, which we ordinarily regard as safe, contains elements of uncertainty or so lacks definiteness as to render our conclusions only approximations. Many of these approximations are, nevertheless, sufficiently accurate for practical uses, as we have found by experience.

Now what is the situation with reference to dairymen, the stock feeder, or the stable man when he seeks to purchase food? What useful knowledge is available to him as a means of guiding him to an economical selection?

In the first place, the feeder may know the composition of feeding stuffs. If he cares to be intelligent in his business he will know that some feeds carry more nitrogenous matter than others; he will understand the variations of composition among the waste products that are in the market as commercial feeds, and he will be aware that all the cereal grains contribute to the ration much the same compounds in much the same proportions. He will learn how the coarse foods differ among themselves and from the grains. Practice and observation will have taught him that some feeds are better adapted than others to a certain class of animals, even though of essentially the same composition. In his efforts to compound rations he will not only have regard for this adaptation but he will keep in mind what practice and science have taught concerning the mixtures necessary to secure an efficient combination of nutrients for the work to be done.

But after all this, there may be several feeds which are essentially alike in composition and nutritive effect but which have different prices, and there still remains the problem of selecting the most economical. If a feeder wishes for carbohydrates from what source should he purchase them? If he needs protein what should he select, gluten meal, one of the oil meals, or some other of the nitrogenous by-products? It is obvious that he should select the feeds that supply the largest quantity of available nutrients for the least money. But what is available material? It is obviously that which the animal can use. The measure of availability is digestibility. Only that portion of the ration which is rendered soluble in the juices of the stomach and intestine and passes into the circulation serves the purposes of food. The unsoluble portion passes out through the draught and is rejected as unavailable. If all the feeding stuffs were dissolved or digested in equal proportions there would be no need of considering what we call digestibility, but this is not the case. Differences in digestibility exist not small but large. From 86 to 88 per cent of the dry matter of the cereal grains, oats excepted, is dissolved by the digestive juices, while the solubility of wheat bran, brewer's grains and oat feeds is, on the average, only about 62 per cent. Oats are nearly a fourth less digestible than corn, barley or rye. The refuse products known as the oil meals are less digestible than the gluten feeds and meals, due, doubtless, to the hulls contained in the former. These facts are important and affect the nutritive value of commercial feeds very materially.

My advice, therefore, to feeders is to base their judgment of the value of feeding stuffs primarily upon the proportions of digestible dry matter which they contain. I am convinced that this method will allow the closest approximation to relative values of any

It is certainly more accurate than a comparison of the proportions of total dry matter. A hundred pounds of corn contains even less dry matter than the same weight of oat feed, but the digestible material of the former is over 30 per cent. in excess of that in the latter.

It is to be remembered, however, that comparisons of this kind can only be instituted between feeding stuffs of the same class. The relative values of oil meal and corn meal cannot be ascertained in this way, neither can those of timothy hay and corn meal.

Why may we properly pay for oil meal and corn meal on the basis of the quantities of digestible nutrients which they furnish? Because the nutrients are not identical in the two cases. Certainly not now, as I have tried to show, and perhaps never, can we establish a scale of values for the nutrients. Digestible material which is 40 per cent. protein cannot be measured by digestible material which is only 10 per cent. protein. When linseed meal is $25 per ton, how much is corn meal worth? I don't know. You might as well ask me what is the agricultural value of nitrogen as compared with phosphoric acid.

Why is it that hay and corn meal are not comparable on the basis of the digestible matter in the two? Certainly the hays from the various grasses have, on the average, about the same proportions of protein in the total digestible matter as does corn meal. This latter query raises a nice point concerning which we have lately been getting new light.

You know that engineers talk about the net result or percentage of efficiency of a steam plant which is used for the performance of work. The basis of the calculation is the gross fuel value of the coal which is consumed. But before this fuel value is applied to sawing or grinding there is a large loss due to draft, radiation, friction, etc. The net heat energy actually recovered in work done may not be over 10 per cent. of the gross fuel value. What is true of fuels is true of foods in a general way. Corn meal and hay have a gross fuel or energy value which may be determined. They also have a net energy value. In the first place, part of every food is rejected by the animal as indigestible, and the potential energy of this portion must be regarded as useless. Again the food must be masticated, moved through the digestive tract and digested before it becomes available. This mechanical effort consumes energy. The net energy may be considered then as the gross energy minus the energy of the undigested portion and that required for mastication and digestion. It is obvious, therefore, that the net energy of different foods must vary greatly. This is true even if we leave out of consideration the undigested portion. For instance, the work of mastication and digestion is much greater for hay than for corn meal. It is probably true in a general way that the larger the proportion of crude fibre in a feeding stuff the greater is the work required for chewing it and pushing it along through the digestion tract. All the coarse feeding stuffs offer considerable mechanical resistance to mastication, and their toughness is due unquestionably to the fibre which they contain.

These statements which I have been making concerning the work of digestion do not rest upon a merely theoretical basis. An able German chemist, Dr. N. Zuntz, has in a very ingenious way been measuring the work of mastication and digestion. In studying this question he has been doing an ideal piece of investigation. It is an example of the kind of research that counts for progress, which we must imitate more largely on this continent if we are to succeed in solving many of our knotty problems. You will be sufficiently interested in Dr. Zuntz' experiments, I am sure, to warrant me in briefly describing so much of his work as relates to mastication and digestion.

These experiments were conducted with a horse. Instead of allowing the animal to breath through his mouth or nostrils, a tube was attached to the trachea (windpipe) in such away as to allow an accurate determination of the amount of oxygen taken into the body and of the products of respiration given off. Oxygen consumption is the most accurate measure we have of the production of energy, or in other words, of the utilization of foods in maintaining the activities of an animal body. The potential energy or heat of

food compounds is made available through what we call oxidation, that is, these compounds are slowly burned and resolved into carbonic acid, water and urea, available energy or heat being one of the products of the change. The quiet animal uses less oxygen than one at work. The oxygen need of the adult man is much less in proportion to his size than is that of the more active boy. The moment that the horse or man begins to increase his muscular effort, there takes place a rise in oxygen consumption and in the products of respiration, viz : carbonic acid and water.

The oxygen consumption by Dr. Zuntz's experimental horse was repeatedly measured under a great variety of conditions—when at complete rest, when doing work of various degrees of severity, and when chewing food of several kinds. We will confine our attention to the facts revealed concerning mastication and digestion. The method of ascertaining the energy used for the mastication of food was as follows : When the horse was at rest, that is doing no work and not eating, the oxygen consumption was ascertained, as well as during other periods when the animal was chewing hay and mixtures of hay and grain. Dr. Zuntz calculates from his determinations that the following heat units represents the energy used in chewing certain feeding stuffs.

1 lb. hay	76.	calories
1 " oats	21	"
1 " maize	6 1.3	"
Green fodder equivalent to 1 lb. hay	47	"

The differences revealed by these figures are very interesting. Chewing green food cost in labor only about 62 per cent. of the effort to masticate an equal quantity of nutrients from hay, the proportion for oats and hay being as 100 to 27 and for hay and corn as 100 to 3 1-3. It was found that when the horse was eating an ordinary mixture of oats and course fodder, the oxygen consumption was eleven per cent. more than during a state of rest, and with a ration of hay alone the increase was 15 per cent. It appears that according to these experiments the horse used 1.4 per cent. of the energy of the material digested from the corn in the labor of chewing, 2 8 per cent. of that from the oats and 11.2 per cent. of that from the hay. Do not these figures help to explain in part the universally recognized superiority of grain food as compared with coarse fodders? We have, to be sure, made no difference in the past between the sources of nutrients in making up a ration. The source of the digestible carbohydrates has been ignored, necessarily so perhaps, though agricultural chemists have long recognized the probability of an error in doing this. Dr. Zuntz, in an article written for the Station Record, makes the statement that "the nutrients which are assimilated from coarse fodders yield the organism about 20 per cent. less available energy than the same amount assimilated from grain," a conclusion based upon the work I have been describing. These are the reasons, then, why I have stated that the hays and grains cannot be compared as to nutritive value by their proportions of digestible material.

For the purpose of comparison, on the basis of digestibility, I would divide feeding stuffs into five classes, the members of each class being comparable among themselves, but not with the members of any other class.

1st. The coarse fodders from the true grasses, including timothy hay, hays from red top orchard grass, millet, etc., corn fodder, corn stover, and the straws.

2nd. Hays from the legumes, including the clovers, alfalfa, vetch and pea fodder, etc.

3rd. The cereal grains and some of their by-products, including corn, rye, barley, oats and wheat, oat feed, barley feed, hominy chops, and some other waste products.

4th. Peas and beans, wheat bran and middlings, gluten feeds, buckwheat middlings, malt sprouts and brewer's grains.

5th. Gluten meals and the oil meals.

The following table shows the digestible material in 100 lbs. of various feeding stuffs, as calculated from average composition and digestibility. In the case of the hays, the water content is assumed to be uniform, viz: 12.5 per cent. while the percentages given for the grains are the averages found by analysis.

	Per cent. of dry matter digestible.	Pounds dry matter in 100 of fodder.	Pounds digestible dry matter in 100 of feeding stuff.
CLASS I. Dried grass plants.			
Corn fodder, dent	64	60	38.4
" flint	68	60	40.8
" sweet	67	60	40.2
Corn stover	57	60	34.2
Hungarian Hay	65	87.5	56.9
Oat straw	50	90	45
Orchard grass hay	57	87.5	49.9
Red top hay	60	87.5	52.5
Timothy, all	53	87.5	46.4
" in bloom or before	61	87.5	53.4
" after bloom	53	87.5	46.4
CLASS II. Dried legumes.			
Alfalfa	59	87.5	51.6
Clover—alsike	58	85.5	50.8
CLASS III. Cereal grains.			
Barley	86	89	76.5
Corn meal	88	85	74.8
Corn and cob meal	79	85	67.1
Oats	70	89	62.3
Oat feed	62	92	57
Rye meal	87	88	76.5
CLASS IV. Nitrogenous feeds, 16 to 30% protein.			
Brewer's grains	62	92	57
Gluten feed	86	92	79.1
Malt sprouts	67	90	60.3
Wheat bran	62	88	54.5
Wheat middlings	75	88	66
Pea meal	87	90	78.3
CLASS V. Nitrogenous feeds, 30% to 45% protein.			
Gluten meal	90	92	82.8
Linseed meal, O. P	79	91	71.9
" N. P	80	90	72
Cottonseed meal	74	92	68

The situation, as I have outlined it, may appear to you to be unsatisfactory. It certainly would be convenient if some universally applicable method existed of determining the relative value of feeding stuffs, but as I understand the facts there is none.

Certain writers and speakers base the value of the nitrogenous feeding stuffs from bran up entirely upon the protein content, and they divide the price by the pounds of protein in a ton in order to determine the relative economy of purchasing this or that material. This seems to me to be absurd, for it is an assumption that the nutritive value of the carbohydrates and fat in commercial foods may be ignored. The argument is that the farm furnishes carbohydrates in abundances and that commercial foods should merely serve the purpose of reinforcing the protein supply. If the carbohydrates of the farm have no selling value then this argument has some force, but this is ordinarily not

the case, and if starch and similar compounds must be purchased as a necessary accompaniment of protein, thus causing a surplus of carbohydrate food, certainly hay, oats, corn, barley, or some other home product may be sold to relieve this surplus.

Once in a while someone talks wildly about leaving food valuation to the "old cow." It is sometimes considered a telling argument against the chemist's wisdom to declare that he and the old cow do not agree. Certainly the cow knows better than the chemist what she likes to eat, and it is little use to offer her foods she does not relish. Even a poor foolish chemist knows that. But if I had a dozen commercial feeding stuffs spread around on a barn floor I would much rather trust an agricultural chemist, or an experienced stock feeder, to pick out a well balanced and economical ration than any cow I ever saw, Holstein, Ayrshire, Jersey, longhorned, dishorned or what not. The cow would probably get at the corn meal and stay by it until well on the way to a cow heaven. Her judgment is just about as good as that of a child with a highly cultivated sweet tooth.

My general position in regard to the purchase of cattle foods is this: Every well informed feeder knows what are the deficiences of his supply of feeding stuffs. He knows whether he should buy largely of protein or largely of carbohydrates, or of both. Aware of his needs he studies the market. Does he lack protein? Then he must decide which of the protein foods furnishes nutrients at the least cost. Is his supply of cereal grains inadequate? Then he should go into the market for materials similiar in composition and determine which is really least expensive. In fact the same policy should be adopted in buying cattle foods as in purchasing fertilizers,—determine, if possible, what is needed and then select the least costly goods of desirable quality.

About twenty-five years ago there was first introduced to the attention of American farmers the so-called German feeding standards. The first public address on this subject in this country of which I have any knowledge was given by Prof. W. O. Atwater before the Maine Board of Agriculture in 1874. During all the time since no subject has received more attention than has the compounding of rations for our farm animals. Experiment Station literature, agricultural papers, and institute speakers have explained and re-explained the nature and economy of balanced rations and have stated and re-stated the standards proposed for each class of animals, until most intelligent farmers have a more or less definite idea of the theories and facts upon which much of our feeding practices are now based,

Twenty-five years have elapsed since these doctrines of scientific cattle-feeding were first proposed to American farmers. Vastly more investigation and experimental research of a more searching character have been given to nutrition problems since the German feeding standards were formulated than before, and after all this period of study where do we stand? I propose to myself a hard task in attempting to answer this question. A critical summing up of the testimony of scientific research and of practical experience which touches the practice of feeding animals is beyond my time and powers, but any man who lives in the atmosphere of discussion of the topic which we have under consideration can hardly help catching the drift of thought—the concensus of opinion. It is probable, though, that what I shall present to you on this divisien of my subject sheuld be considered as largely personal opinions, mixed with more or less of historical facts.

The feeding standards so much quoted were proposed by Dr. Emil Wolff, the first director of the first German experiment station. These consist of a statement of the amounts of total digestible material which should be fed daily to the various classes of farm animals per 1,000 pounds live weight, with the proportions of the different nutrients that should be present. For instance the proper daily ration for a milch cow, according to Wolff's standard for many years, should contain 15.5 lbs. of digestible matter two and a half pounds of which should be digestible protein, giving a ratio of digestible protein to digestible carbohydrates (including the fats two and a half) of 1 to 5.4. Standards of this kind were formulated by Wolff for animals doing no work, working animals, growing animals and fattening animals of various kinds.

But how did the scientific experimenter arrive at these quantities and proportions? In the first place the chemist had learned how to approximately determine the proportions

of the various constituents in plants, the water and dry matter, the protein, carbohydrates and fats. Moreover, through a study of the animal and its life processes it had been ascertained that the solid excrement from an animal is its undigested food. The application of this knowledge made it possible to discover what proportion of a food or a ration and of its various constituents was utilized by the animal and what proportion was rejected. Two rations could thus be compared as to the kind and quantities of nutrients supplied by them, and differences in nutritive effect were thus explained on a rational basis. The actual quantities of nutrients utilized by milch cows, growing and fattening animals, were measured and different combinations of feeding stuffs were tested as to their equivalence in productive value.

Wolff, Henneberg, Stohman and Kuhn, at the Hohenheim, Weende and Möckern experiment stations, were the principal early workers along these lines of investigation, which were carried on through the actual feeding of different classes of animals. Voit, Pettenkofer, and others, also made researches as to the use and function of the different nutrients in the animal body. Oxen and sheep were fed such rations as seemed to just maintain a condition of no growth and no loss, and the actual nutrients used were measured. Fattening animals were fed in a few cases rations varying in their proportions of protein, fat and carbohydrates, and the growth determined in each case. Especially with milch cows were careful experiments conducted in order to learn the proper relation of nutrients to insure an efficient and economical use of food for milk production. Rations with varying quantities of the nitrogenous by-fodders were fed under conditions of critical observation and their effect on the amount and kind of milk noted.

On the basis of observations like these, supplemented by knowledge derived from the researches of the chemical physiologist, the German standard rations were proposed. It must be confessed, standing as we do in the light of a larger knowledge, that the formulation of such standards at that early date was somewhat hazardous. The data relative to certain classes of animals were too meagre and too incomplete to warrant even a recommendation as to the average combination of nutrients calculated to produce the best possible such results. The experiments with maintenance rations and rations for milk cows had been as to allow conclusions which should carry some weight, but the data bearing on the feeding of fattening animals, in my opinion, were not enough to show whether a nutritive of 1:5.5 or 1:6.5 was more effective than a much wider ratio. Neither does it appear to me that the researches concerning the efficiency of food mixtures for working animals pointed particularly to one proportion of nutrients as the proper one to adopt.

It is probably true that German scientists regarded these early presentations of feeding standards in much the same light. They put them forward tentatively, not as fixed rules, but as suggestions to good practice, with the hope of clearer views in the future. Many persons on this side of the Atlantic accepted these standards too literally. Warnings were uttered against doing this. It has been stated again and again by good authorities that these formulas point out food mixtures that are known to be efficient, and are not fixed rules to be accepted blindly. As nearly as 1878 Prof. Atwater illustrated his own views by quoting the statement of a German farmer, who when asked what he thought of the feeding standards replied, "As indications of what is best they are invaluable; to follow them blindly would be folly."

Now, in saying all this I do not wish to minimize the value of the German standard rations to the American dairyman and stock feeder. Our feeding methods stand on a far more rational basis to-day than would be the case if we had never heard of pounds of digestible nutrients and nutritive ratios. We have been led to a careful scrutiny of feeding stuffs, their composition and digestibility. Rations variously compounded have been compared as to their relative productive capacity. The setting of such standards has caused us to judge rations not by mere weight but by what they actually furnish of digestible material. Uniformity of feeding has been thereby greatly promoted, errors of practice have been corrected, and our knowledge of foods as related to production of milk and meat has been progressing along rational lines with a full recognition of cause and effect. Opinion and tradition have been giving way to demonstration.

Let us now return to our original question, viz.: After twenty-five years of experiment and research since the German standard rations were proposed, where do we stand? As I have already intimated, when the German feeding standards were formulated there was undoubtedly taken into consideration not only the direct results of feeding experiments, but also the views which then prevailed concerning the functions of the several nutrients. First of all the portein of foods was then held to have a more prominent relation to the production of muscular energy than is now believed to be the case. It is now generally conceded than an increase of the work performed by an animal results chiefly in an increased use of carbohydrates, the destruction of protein not being materially augmented. It is still confessed, however, that severe work, whether by man or beast, necessitates a liberal supply of portein. Nevertheless the direct source of energy for muscular activity seems to be the oxidation of starch, sugar and similar compounds, wherever these compounds are present in the digested food in sufficient quantities.

The views entertained by leading authorities relative to the production of animal fats have been materially modified during the past 25 or 30 years. Following the lead of Voit, and other prominent students of the chemistry of nutrition, the opinion was widely entertained that portein plays an important part in fat formation. Dr. Emil Wolff in his large work published in 1876 on the Feeding of Farm Animals, in summarizing the existing knowledge concerning fat formation, declares that fat may arise in the animal body both from the storage of food fat and by its formation from protein compounds; that carnivorous animals can only construct fat from protein and not from carbohydrates; that the food protein and fat have been sufficient in all observed cases with herbivorous animals to acccunt for the body fat formed, so that it is not necessary to take the carbohydrates into consideration as fat-building material. Dr. Wolff admitted, however, that the question of the relation of carbohydrates to the production of animal fats was not settled at that time.

Since Wolff's book was written a great change has taken place in the opinions of the scientific world regarding the constructive function of food nutrients. It is now everywhere recognized that the body fats of swine and bovines are formed in large proportions from starch, sugar and similar compounds. The source of milk fat long remained in doubt, the prevailing opinion expressed in text books of physiology, even up to the present time, being that its origin is due to the splitting up of proteid tissue in the mammary glands. Recent experimental work seems to prove, however, that milk fats, like body fats, may have their source in carbohydrates.

It is very evident to any one familiar with the present status of knowledge concerning animal nutrition that there has been a marked change in the general scientific estimate of the relative importance of protein and carbohydrates. It does not appear, however, that these modifications of our views are likely to lead to a revision in the immediate future of the feeding standards that were proposed by Wolff. Experimental evidence, rather than theoretical considerations, will certainly be required as a justification of any change in these formulas. It is a significant fact that for many years no substitutes for Wolff's formulas were proposed, at least not on such a basis of demonstration as to obtain general acceptance. This was not due, I believe, to a common consent that nothing better could be offered, but rather to an enlarged appreciation of the great knowledge necessary in order to establish the best average combination of nutrients for milk production or for any other purposes. Within a comparatively recent time Dr. Lehman has proposed modifications of the Wolff standards. Outside of recommending more protein for working oxen, these consist chiefly in graduating the ration for milk to suit the production. According to Dr. Lehman a cow producing 11 pounds of milk per day is to receive 11.9 pounds of digestible nutrients, while one yielding 27½ pounds should be fed 17.4 pounds. The nutritive ratio is also to be narrower in the latter case. This appears to be a sensible proposition, and is really what the wise feeder does, only perhaps not in the same ratios proposed by Lehman. But I feel sure that even now no concensus of knowledge is possible that would emphatically ratify all the old standards as the best

obtainable or establish new ones for the feeding of certain classes of animals. We are confessedly ignorant of many facts and principles which pertain to the processes of nutrition, and until we know more of the exact functions of food compounds we should be very modest in laying down fixed rules.

Many well informed persons entertain the opinion that no useful standards are possible, that the individuality of the animal, the kind and cost of foods and the value of the animal products, cause such large and frequent variations in practice as to practically annul the influence and acceptance of a common standard. I must differ from this view, and the reasons for my position lie in the effects which feeding standards have had upon practice, as I have pointed out. It is much wiser to measure practice by some standard, which is the best that human knowledge and experience can devise than it is to individual opinion based upon very incomplete data and illogical deduction. Permit me now to express to you somewhat concisely my personal estimate of the situation relating to feeding standards.

The total quantities of digestible nutrients recommended as daily rations for production by the various classes of farm animals appear to me to meet successful practical conditions fairly well, and in my judgment need no very important revision, especially those pertaining to milch cows and fattening animals. The maintenance ration recommended by Wolff is undoubtedly in excess of the requirements. This appeared to be indicated some years ago by the feeding trials of Sanborn and others. Quite recently Dr. Armsby of Pennsylvania has shown through very carefully conducted experiments that less than 8.8 lbs. of digestible matter will maintain an animal without loss. Dr. Armsby's figures do not differ essentially from those reached at an early date by Hoffman, who found that 8 lbs. of digestible nutrient daily maintained steers without change in weight or appearance. Wolff's purpose in recommending more than experimental evidence seemed to demand, may be due to the very general desire of all who make public statements to be on the safe side

Concerning all the nutritive ratios to which we have been asked to conform I do not feel warranted in speaking with great emphasis, or with equal confidence. The formula so long in use for a milk-producing ration has appealed to me as one of great practical value. In a general way it seems to have been ratified by experimental evidence. This standard milk ration has been strengthened rather than weakened, I think, by the critical study given it since it was first proposed. I do not mean to say that a moderate departure from a nutritive ratio of 1 : 5.4 is proved to be fatal to efficient results, but I do claim that rations carrying from $2\frac{1}{4}$ to $2\frac{3}{4}$ pounds of digestible protein include those which severe tests have shown to be most efficient for intensive milk production. My opinion is that the addition of nitrogenous by-fodders to the home-raised feeding stuffs has greatly increased the efficiency of a unit of digestible material. Whatever may be the function of the several nutrients in milk formation the presence of abundant available protein in the milk ration is certainly stimulative to milk secretion, as observation abundantly proves, and the Wolff standard seems to compare in the average approximately with such rations as good practice recommends.

Woll of Wisconsin secured, in 1892 and 1894, a valuable summary of the rations fed to 128 herds located in various parts of the United States. Assuming that the estimated weights of feeding stuffs as reported were correct, which is very doubtful, and that the application of average coefficients of digestibility to those rations gives approximately correct results, the amount of digestible nutrients in these daily rations varied from 14 to 18.4 pounds with an average of 16.2 pounds. The range of digestible protein was found to be from 1.8 pounds to 3 pounds, the average being 2.15 pounds. The average nutritive ratio was 1 : 6.9, which is wider than Wolff's recommendation. These herds doubtless stand for the best American practice in certain localities, and it is worth while to know whether it departs from the Wolff standard.

Woll expresses the opinion, based upon these observations, that the average ration fed these 128 herds should be adopted as an American standard in place of the Wolff standards. This may be a correct judgment which will be ratified by further observations.

A practice, however general, is, nevertheless, not necessarily correct because it is a practice. While it is worth heeding, it scarcely ever amounts to demonstration. It would probably be possible to find 128 other herds eating an essentially different average ration, and one practice is as significant as another until demonstrative proof shows a difference. Moreover, the rations of successful feeders vary from year to year, doubtless, according to the prices of commercial feeding stuffs, wisely so probably, as a matter of cheapening cost of production. Practice is more likely to be sensitive to commercial conditions than to any conscious recognition of the economical physiological use of food nutrients. Still further, the figures Woll would adopt are the averages of widely varying figures. Whether one of the extremes is not better than the average does not appear. It is noteworthy, however, that the nitrogenous by-products were freely and generously used in these 128 herds, thus giving some support to the doctrine that home-raised foods are economically supplemented by materials more nitrogenous.

The most extensive accurate study in this country of feeding practice on individual farms managed commercially was made by the Storrs (Conn.) Experiment Station during the years 1892 to 1896. In this case the work was thoroughly done. The rations were weighed and analyzed, also the milk. A narrow nutritive ratio was repeatedly compared with a wide ratio, and the evidence obtained was decidedly favorable to the narrow ratio whether in regard to the yield of milk, economy in the use of food by the animal or net commercial results. During three years eight herds were fed a narrow ration following the wider one which the farmers had been using, and notwithstanding the natural shrinkage which occurs as the lactation period continues, in five herds there was an increase flow of milk from the latter ration, three herds holding their own. On the average the saving from the latter ration seems to have been six cents for each hundred pounds of milk and two cents for each pound of butter. This commercial result hinges, however, on the prices of feeds and might be reversed in another locality where market conditions were widely different, as Prof. Henry of Wisconsin shows.

A distinction must always be drawn between physiological results and commercial results. I have not the slightest doubt, basing my opinion upon the teachings of a great number of feeding experiments with dairy cows in this and other countries, that rations with a narrow nutritive ratio will produce, other things being equal, more milk solids per unit of digestible food consumed than rations with a wide ratio. It does not follow from this that a narrow ratio is always profitable. The relative prices of feeding stuffs will determine this. In the Eastern United States it generally is, but may not often be in the Western United States, and it sometimes demands the exercise of considerable knowledge and a trained judgment to decide upon the method of feeding most profitably. My advice to you is, then, keep the standard ration in mind as the best known rule for feeding, and then work as near to it as commercial conditions will permit. What has been said of the importance of a generous protein supply for milch cows applies in a general way to growing animals. Careful experiments ratify common experience in teaching that when young animals are expected to form tissue rapidly the grain ration should consist in part of some one feeding stuff that carries a fairly high proportion of protein. No one is wise enough to consistently affirm that the nutritive ratios recommended for the various classes of young animals are the very best averages that can be found, but they certainly do represent combinations of nutrients that sustain rapid and healthy growth.

The doubts which I entertain concerning the practical importance of the published feeding standards relate chiefly to those recommended for fattening animals. No marked distinction seems to be made between the rations approved for milk and growth and those suggested for fattening steers and sheep. Theoretically this appears to be inconsistent because, so far as we can judge, the protein demand for the milch cow is much greater than that of the fattening steer. A fattening steer gaining 1.75 lbs. per day is doing fairly well, so is the cow giving 25 lbs. of rich milk. The protein contained in the 1.75 lbs. of added flesh is not far from one-eighth of a pound, while the 25 lbs. of rich Jersey milk contains approximately one pound of protein, eight times as much as that in the new tissue formed by the steer. For known constructive uses, then, the demands of

the cow far exceed those of the steer. It may be claimed that the steer fat is derived in part from protein, but after the conclusive demonstrations which we have had of the abundant formation of body fat from carbohydrates it does not seem that the demands for protein to be so used are necessarily very great. And in any case the fat in the cow's milk is practically as much as that in the daily increase of the rapidly fattening steer, and seems as likely to originate in the protein.

I am well aware that, as I have already stated, experimental evidence and not theory will decide all such questions as these, and I am not ignorant of the fact that several comparisons of rations for fattening purposes have resulted in favor of the narrower ratios. The majority of such comparisons have had this outcome, I think. But in conducting such experiment I have become conscious that when sufficient palatable food is provided the steer is much less sensitive to a change in the protein content of the ration than is the cow in full milk.

Perhaps my personal view of this matter is colored by my experience in conducting an experiment which had for its purpose a determination of the influences of different rations upon the composition of the carcass of the steer. Four shorthorn steers were taken as calves and were fed from seventeen to twenty four months, one pair on a ration with a ratio of about 1:5.2 and the other pair on a ration in which the ratio was 1:9.7. These steers were all killed and their entire bodies analyzed. There is no question that when these steers were quite young and in an active growing condition the narrow ratio was much superior to the other. This superiority gradually diminished as the animals matured, and during the last year of the life of one pair, the wide ration was fully equal to the other in its nutritive effect. I feel willing to prophesy a future general recognition of the fact that when fattening animals are given such a variety of grain foods in the ration as to stimulate a vigorous appetite and generous consumption a very wide range in the nutritive ratio may be allowed without materially affecting the result.

It is entirely possible that these statements have been disappointing to some of you, and you may regard them as a confession of the incompetency of scientific men to aid the farmer.

Remember, however, that science is limited by the boundaries of knowledge. Earnest and conscientious students of the material world, and I would imitate such, are generally reluctant to claim for science more than she can accomplish, and they certainly are not blameworthy for confessing their ignorance of that which has never been discovered. Rather blame those who "venture where wise men fear to tread" and ignorantly place science in a false position, thereby causing certain future disappointment. During the past twenty years we have had too many instances of self-appointed teachers who from the platform and through the press have made most marvellous declarations in the name of science. At times our souls have cried out for discriminating editors and institute speakers competent to winnow the sound grain from chaff and false seeds.

The advance of sound knowledge among the people has been retarded by reason of the unwarranted deductions of the uninformed. This should not be so. In these days of such intense activity in the field of scientific investigation let us stand modestly in the presence of infinite truth, and may we not open our mouths to prophesy until there comes to us the call of conscious preparation. In this way, and this way only, shall we gain the sure confidence of the people whom we would lead.

PRACTICAL BUTTERMAKING.

By Archibald Smith.

In the manufacture of fancy butter the first requisite is the very best of raw material. That means milk from good healthy cows which have been fed wholesome, good flavored food. Avoid the feeding of turnips, potatoes, musty or decayed food, or anything that will have a tendency to injure the flavor of the milk. As milk contains about eighty-seven per cent. of water, farmers will at once see the necessity of giving the cows nothing but good clean

water. Brush the side and udder of the cow in order to prevent any filth from falling into the milk pail. Milk with clean dry hands and remove the milk as soon as possible to a place where the atmosphere is pure. Strain through a fine seive and aerate it well by pouring from one vessel to another. All vessels containing milk should be kept perfectly clean. After milk is cooled to the temperature of the surrounding atmosphere it readily absorbs any bad odors with which it comes in contact, hence the necessity of keeping it covered and in a clean place.

When sending milk to the factory in the cold weather some farmers are in the habit of allowing it to become frozen. Now this is a great mistake, as it not only makes the milk harder to separate but also injures the flavor of the butter.

The second requisite is a good factory with a sufficient supply of pure water. It should have good drainage in order to carry off the refuse and prevent any objectionable smell around the factory, and be well equipped with the best of machinery and all necessary appliances.

Every creamery should be provided with a good storeroom in which to put the butter, where the temperature can be kept as low as 40° F., in order to prevent the butter becoming heated and losing its flavor.

The third requisite is a buttermaker who thoroughly understands his business, the manufacture of the butter and the proper care of the factory, its utensils and machinery. There are far too many men at the present time engaged in the manufacture of butter who have not had sufficient experience, and the result is the production of a poor quality of butter and an enormous loss to the farmers.

I would advise every buttermaker to spend one term at a dairy school, but before doing so he should have at least one season's experience in a creamery in order to obtain the greatest benefit from the teaching.

There was a time when it was hard to secure the services of a good buttermaker, but the supply is now increasing faster than the demand, and the time should come when only the most expert will be employed.

When receiving milk at the creamery every buttermaker should be able to detect that which is of inferior quality and bad flavor, and, if possible, give a remedy for the same. Give good honest weight and never accept milk which has been refused by the maker in a neighboring factory.

When heating the milk for separating, care should be taken to stir it gently to prevent it burning on the sides or bottom of the vat. It is not advisable to heat the milk in a receiving vat owing to the danger of it becoming sour before being separated, when receiving large quantities. It is also difficult to keep the temperature uniform, as it is lowered by each addition of cold milk. I would, therefore, recommend the use of a tempering vat large enough to hold sufficient milk to feed the separator for at least five minutes.

By heating the milk the density is decreased and the difference in the specific gravity of the fat globules and the other constituents of the milk is increased, and it also increases the capacity of the separator.

Butter fat not being as good a conductor of heat or cold as the other parts of the milk, it is necessary to have it heated for at least five minutes before being separated in order to get the best results. It is only necessary to heat the milk to the temperature at which the separator will do clean skimming and make smooth cream when running at its full capacity, which will be from 80° to 85° in spring and summer, and 90° to 95° in winter. Samples of the skimmed milk, and also of the buttermilk, should be taken daily and tested with the Babcock test in order to prevent an unnecessary loss of fat in either, using the skimmed milk test bottles for the purpose.

As there are a number of different kinds of separators on the market, differing somewhat in construction, it is impossible for me, in the time at my disposal, to give directions for running the different makes. But the principal of separation being the same in all separators, separation being caused by centrifugal force, buttermakers will at once see the

necessity of keeping the speed regular and as high as each particular make of separator requires. The number of revolutions which the bowl is intended to make are usually stamped on the bowl, and it is not advisable to run the separator much faster, owing to the danger of heating the bearings and injuring or bursting the bowl.

After the separator has been well washed, all parts coming in contact with the milk should be thoroughly steamed in order to destroy any germs which may have been extracted from the milk, and to leave the separator perfectly dry to prevent it from rusting.

Every cream vat should be so constructed that the buttermaker will be able to cool the cream quickly, and it should also be provided with a tight-fitting cover to prevent evaporation of the moisture which causes the cream to dry on the top and sides of the vat and also prevent any bad odor which may be in or around the creamery from coming in contact with the cream. In the cold weather it will also help to keep the temperature of the cream uniform.

In the ripening of cream a good starter is almost indispensible, as it hastens the development of lactic acid, allows the cream to be ripened at a lower temperature, and, to a great extent, controls the flavor of the butter. The use of buttermilk for a starter is not advisable.

A good starter may be made by heating a quantity of milk, to which has been added about twenty-five per cent. of clean water, to a 160° F., and let it stand for twenty minutes in order to destroy and expel any objectionable flavor; then cool quickly to 80° or 85° and add a portion of the previous day's starter as a culture, providing it is of good flavor. Do not disturb the starter until ready for use, then skim a couple of inches off the top and throw it away, as it is usually of poor flavor. Stir the remainder thoroughly by pouring from one vessel to another and strain it into the cream when first starting to separate. The quantity of starter to be used will depend upon the condition of the cream and the time required for ripening.

A number of instructors and makers advocate pasteurizing the cream, which means heating it to 158° or 160° and holding it at that temperature for twenty minutes before cooling, in order to destroy any germs which cause bad flavor; but unless the buttermaker is troubled with bad flavors which cannot be remedied by the patrons or by the use of a good starter I do not recommend it. I hold that the patrons should deliver their milk at the creamery in a condition that would enable the buttermaker to make the finest butter without the unnecessary expense of pasteurizing. If the farmers would take as good care of their milk when sending it to the factory as some of them do when sending it to the towns and cities pasteurizing the cream would be unheard of.

To get the best results in churning the cream should contain from thirty to thirty-five per cent. of butter fat. Some of the advantages of having rich cream are: there will be less volume of cream to handle; the cream may be ripened at a higher temperature and churned at a lower temperature which will give a more exhaustive churning.

Use sufficient starter to ripen the cream in about four hours after being separated. By this method the buttermaker is better able to control the flavor of the cream and prevent any objectionable odor which may have been on the milk from developing. The cream may be cooled to the churning temperature earlier in the day, and it will be at a low temperature for a greater length of time before churning, which will give better body and texture to the butter.

When ripening the cream quickly the buttermaker should be very careful to cool it quickly when it shows sufficient acid, and never allow it to develop too much acid at a high temperature. Stir the cream frequently in order to ripen it evenly and keep the temperature uniform.

Ripening the cream simply means the development of a certain kind of germs or bacteria which decompose the albuminous constituents of the milk and change the milk sugar into lactic acid. To develop the required flavor and the same amount of acid each day is probably the hardest part of the butter-maker's work and demands the most careful attention.

When cream is properly ripened it has a smooth glossy appearance, a pleasent acid taste and smell, and will pour like thick molasses and show about seven-tenths per cent. of acid by the alkaline test. It should be the aim of every buttermaker to make the same quality of butter every day, in order to make a good reputation for himself and receive the highest price for his goods.

In factories where the churn becomes mouldy, when only using it every second day, it is advisabie after washing it well with hot water to which has been added sal-soda, to close the lid and attach a hose to the butter-milk outlet and steam it thoroughly for twenty minutes, then open the lid again. The intense heat will destroy all germs and cause rapid evaporation of the moisture, leaving the churn perfectly dry and clean. Strain the cream into the churn and add color if the market demands it. The condition of the cream as regards temperature, density, acidity and the amount of cream, will govern the time taken to churn. Never fill the churn more than half full, and churn the cream at a temperature that will bring the butter in granules, about the size of wheat grains or small peas, in 45 to 60 minutes.

Separator cream should be churned at 50° to 54°, but in cream-gathering creameries it will probably be necessary to churn at a little higher temperature. If the cream is very rich it will be necessary to add a quantity of cold water when the butter is about half gathered, to get a good separation and make the granules uniform.

If the butter is to be consumed in less than two months one washing will be sufficient. Avoid using water which is more than four degrees colder than the butter, and never use water which is warmer than the butter. Add as much water as there was cream, and revolve the churn quickly for ten or twelve revolutions; then draw the water off quickly and allow the butter to drain for fifteen minutes.

It is advisable to put a small quantity of salt into the water used for washing the butter, as it has a tendency to make the butter firmer and brighten the color. It also separates the casein from the butter fat, and as the casein is heavier than the fat, it sinks to the bottom and is carried off with the water.

In the salting of butter the maker will need to be guided by the requirements of the market for which the butter is intended, and also the condition of the butter having regard to the moisture which it contains. From one-half to five-eights of an ounce of salt per pound of butter is sufficient for the British market, and three-quarters to one ounce for the Canadian market.

When the butter is to be salted in the churn—which is advisable when convenient—use about one-eight of an ounce more salt per pound of butter, being careful to distribute the salt as evenly as possible through the butter, then give the churn a few revolutions to bring the butter together, and allow it to stand from thirty to sixty minutes for the salt to dissolve, being careful to keep the lid of the churn closed to protect the butter from the heat or cold.

The salt used in the manufacture of butter should be of fine, even grain and easily dissolved. It should be put up in paper-lined barrels and kept in a clean dry place, as it readily absorbs any foul odors with which it comes in contact and imparts the same to the butter.

If butter is worked in a cold room it usually expels to much moisture and requires a great deal of working which injures the grain and texture. It is therefore advisable to have the room a little warmer than the butter, so that the granules will adhere together more readily and come into that waxy condition which is so desirable, yet so seldom found in winter butter.

If a butter-maker is able to tell by the appearance of the butter when it is worked sufficiently one working will be enough, but if not it is safer to work the butter twice.

Some instructors have said that when the butter receives a certain number of revolutions on a certain kind of a worker, or when it can be turned over one-half or all the way without breaking, it is worked sufficiently, but as there are a number of different kinds of workers on the market and the butter is not always in the same condition, these are not

very safe guides to go by. When sufficient moisture is expelled and the salt is properly incorporated and dissolved, the butter becomes close in body, and when cut with a butter spade shows no signs of pin-holes and has a nice bead, such as is seen on the back of a tryer when boring butter of good texture.

When preparing butter for the market great care should be taken to put it up in a neat and attractive form. For the local market the pound prints are very convenient, but for the export trade the square box holding fifty-six pounds is principally used. They should be well coated on the inside with paraffine wax and lined with the best of parchment paper which has been soaked in cold brine before using.

Pack the butter solidly in order to prevent air-spaces and unsightly holes when turned out on the dealers' counters. Put nearly fifty-seven pounds in each box and trim off the top neatly, using a notched stick or square butter spade for the purpose. Do not put much salt on the top; a very thin paste is sufficient. The boxes should be kept clean, and shipped in a clean waggon, which will not only help the sale of the butter, but also the reputation of the factory.

I would strongly advise the patrons of cream-gathering creameries to purchase hand separators. A separator would soon pay for itself by the increased amount of fat taken from the milk. Better care could be taken of the cream, because there would be no milk to look after, and the skimmed milk would be in a better condition for feeding. The separator could be adjusted to deliver cream of the required density. The test would be the same each day, less milk would be required to make a pound of butter, and the buttermaker would be able to produce butter of a better quality.

While going through some of the creameries and store houses of Western Ontario, this winter, I was surprised to see so many different kinds of butter. I may say there were very few buttermakers making butter of the same quality. I would like to see the buttermakers of each district, unite and agree on a uniform system of making, so that when the butter is offered on the British market it will not only be of excellent quality, but also be uniform. I think that this is the only way by which Canadian buttermakers will ever be able to excel that made in other countries and win for Canadian butter the enviable reputation of Canadian cheese.

Mr. McFarlane: Have you had experience in feeding turnips?

Mr. Smith: No; I have had no experience in handling milk from cows that have been fed turnips.

Mr. McFarlane: Can you feed turnips without having a bad flavor?

Mr. Smith: According to some experiments a certain amount of turnips could be fed without having a bad result, but as they do produce bad results it is better not to feed them at all.

Mr. McFarlane: From that I think that they should see if they could feed them without producing bad results; I think you ought to try the experiment.

Mr. Smith: Buttermakers do not often inquire into how the thing is fed; if they know how this food produces bad results that is sufficient to condemn it.

Mr. McFarlane: Have you ever had any experience in different cows' milk, making different butter?

Mr. Smith: In the different factories in the country there is a great deal of difference in the milk, in regard to butter.

Mr. McFarlane: Did you ever try to see how much longer one cow's milk will keep than another's?

Mr. Smith: No.

The Chairman: Mr. McFarlane says he can feed turnips without having bad results. He is one man in a thousand, and we cannot possibly let that statement go unchallenged, because when he can do it 999 men cannot, and it is not safe to try it.

Prof. McKay: There is one way of feeding turnips by which they will not effect the butter, and that is to pasteurize the cream.

Mr. McFarlane: I never pasteurized the cream; people who feed turnips do not do it the way I do.

Mr. A. Wenger: I cannot discuss these papers that have been given to us herotofore, because I have run my creameries on the cream-gathering system. I believe every word this man has spoken is right and correct, but I cannot add to it. I would like to say that this is a missionary society. We have you here, and we want to send you all out as missionaries. You are all right or you would not attend these meetings. It is the people who do not attend that we want to get at. I would like to tell that gentleman who spoke about feeding turnips that is one of my great difficulties in my creamery business. There are so many patrons who think they can feed a few turnips without making any bad results, and consequently I frequently have to shut down my creameries in the fall, when they should be run for a month or more. They have the idea that it will not make any difference if they feed a few because they say nobody else will be doing it, and it will not be noticed, but in feeding turnips they are robbing me and robbing the good patrons who are anxious to give me good cream. These people are being injured by the few who are dishonest to me, and dishonest to themselves, and dishonest to their fellow patrons. I would not like any of you to go away from here with the belief in your mind that you could feed turnips to your cows and not injure the butter, because I know it does injure it every time. If you want to feed turnips you can make your own butter, and sell it where you can. I do not want any turnipy cream, and I will not have it. (Loud applause.) Now there is another phase that has been touched upon, and that is the matter of cleanliness. Milk cannot be handled too carefully. There should be nothing but tin pails used, and they should be kept thoroughly disinfected and the cows' udders should be cleaned before they are milked. These are subjects that it should not be necessary to discuss, but we cannot impress upon the patrons of the factory too strongly to be clean in everything they do, in regard to their cows and their milk.

BUTTER FLAVORS.

By Prof. G. L. McKay, Ames, Iowa.

Our government, as many of you are aware, is trying to build up a trade for our surplus butter in the same market that you are after, so you see we have a friendly rivalry for that market. From the general returns or quotations from the English market I see there is room for improvement both with United States and Canadian butter. I am aware there are some small lots of butter from both countries that possibly sell with the best in the English market. John Bull is a trader of the first water; if he can get the goods that suit him, and the prices are all right, sentiment does not cut much of a figure. He does not care from whence they come. In our country we are unfortunate, or I should say fortunate, in having a better market at home for our fine butter most of the year than there is abroad. Now that our people are prosperous, I presume there will be very little butter shipped from the United States to England for a number of years.

Much of the butter that has gone abroad from the United States has been what we term ladled goods, or second grade. This has had the effect of giving the Englishmen the wrong impression of our butter, and I persume you have had similar experience with shipping ladled goods across the water to compete with the fine Danish creamery goods. We must send our very best goods if we expect to successfully compete with Denmark, and if we do I have no fear for the results.

Our Secretary of Agriculture, James Wilson, who, by the way, used to live near Paris, Ontario, has been, and is still, doing a grand work for the dairy industry of the United States. During the past two years he has selected a half dozen of the best creameries, and I might state that our College creamery was included in the list, to make butter to

send abroad, to demonstrate to the English people what the Americans can do in the way of making fine butter. These tests have thoroughly shown to our satisfaction that we can successfully compete with any country if the time ever comes when we will have to seek an outlet for our surplus goods. The butter we sent had half of each shipment made from pasteurized cream. It was scored by the best experts in our country, also by the best in England, thus affording us an opportunity to test the merits of butter made from pasteurized cream with that made from raw cream.

In summing up all these tests, we found practically no difference either in price or in the scoring. It is true in one case that the highest score we received was on butter made from pasteurized cream. This score was 95 in the English market, marked off two points on color, although no coloring matter had been used. Two off on salt, when only one-half ounce of salt had been used to each pound of butter, and one off on package. It would seem by this score that our grass produced too high a natural color to suit the English market. The salt could possibly be reduced, although I would not advise anyone to salt less than one-half ounce per pound during the summer months, owing to the long distances of transportation, unless they have better facilities for shipping than we have. We found the scoring in all cases to be lower in the English market than it is on this side of the water. The butter I have just referred to as being scored perfect in flavor, was what I would term "convention butter." I mean by this, it had that high, quick aroma that many contend is not found in butter with good keeping qualities. In all cases the butter that scored highest on our side of the ocean ranked the highest on the other side also.

The question of flavors is an important one, especially with buttermakers. This is not to be wondered at, as flavor counts nearly half the total in scoring. We have no way of determining flavor except by taste or smell. That is, we have no chemical test by which to measure the flavor. The flavor is a very important factor in governing the price of all dairy products, as well as fruits, so everything that has any bearing on flavor is very important. At certain periods of the year very little difficulty is experienced in producing high-flavored goods. June has been singled out by many people as the ideal month. Some have analyzed the grasses at this period to find out what nutrients they contain, so as to substitute these at other periods of the year, but so far there has nothing definite been found to show that feed governs flavor.

If I were to ask the cheese buyers present what months the best cheese were made in, they would without doubt say September and October. So we find opinions differ as to what are the ideal months. I do not contend that feed has no effect on flavor, but I do contend that fermentation has a greater effect. Not long ago, while I was discussing this subject with some dairymen at Topeka, Kansas, one gentleman seemed to think that I was not giving June grass due credit for its influence on flavor. Professor Cottrell, of the Kansas Station, told his experience with Ex-Governor Morton's herd in New York State. He said he made butter in October that was scored 100 points by Orin Douglass, of Boston., who is considered one of the best judges in America, and the cows had not been on grass for three years. In this case it would seem that the June flavor was not what it was supposed to be. I am well aware that certain foods, such as wild onions, leeks and turnips, have a decided effect on flavor unless the cream has been pasteurized. These seem to be charged with volatile acids, as during pasteurization their obnoxious products pass off or evaporate. Pasteurization does not seem to have the same effect on tainted milk, which is caused by putrefactive bacteria, for the reason that the products of these bacteria are undoubtedly non-volatile and do not evaporate.

Experiments have recently been conducted in England at the South Eastern Agricultural College, where cotton seed oil cake has been fed to cows to the proportion per cow of from two to seven pounds.

Butter fat gave cotton seed oil reaction twenty-four hours after feeding with the cake, and continues several days after stopping. Amount of cotton seed oil present in butter from cows fed with cotton seed oil cake, less than one per cent. This would indicate that some feeds have an influence on the fat.

When cows are on dry feed there is a period in the winter months when the average butter and cheesemaker has been unable to make fine goods. This has been attributed by many to the food consumed by the cow, and by others to the advanced period of lactation. I remember attending a convention in the city of London, Ontario, some fifteen years ago, when the advisability of shipping early spring or winter cheese to the English market was discussed. The late Mr. Caswell, of Ingersoll, got up and opposed it. He said he never saw but one lot of cheese made in the winter that possessed that high summer flavor, and these were made by a dairyman from Norwich, by the name of Chapin. He said he was so interested to find our how these cheese were made that he drove out there, a distance of sixteen miles, to find out the secret. The only information he got was that Mr. Chapin had fed clover hay and some meal to his cows. Now, I was personally acquainted with Mr. Chapin, and knew that these cheese were made from the milk of cows well along in the period of lactation, as he was a man who milked cows for about ten and a half months out of the year. At this time very few farmers had fresh milch cows in the fall or early winter. I contend that this high flavor was not due as much to the feed as to the proper fermentation. Mr. Chapin, from a sanitary points of view, was an ideal dairyman. He did not use straw for bedding his cows, but sawdust, which practice I would not recommend to farmers, although I think it would be more free from germs than straw. All manure was scraped to the gutters the first thing in the morning. As soon as the milk was drawn from the cow it was conveyed to the cheese room, thus avoiding many of the obnoxious stable germs. This room was usually kept at a moderate temperature.

The germs that get into the milk from the stable are far more injurious to the flavor than those that get into the milk when the cows are milked out of doors. I think possibly this is the reason that Denmark has adapted pasteurization of milk so universally, as they stable-feed their cows most of the year. They use a lactic acid ferment for a starter.

Some four years ago, after I had experimented with the ripening of cream for one year, I made the statement at the National Convention that the ripening of cream controlled the flavor of butter, other conditions being favorable. This remark called forth considerable criticism at that time. Undoubtedly most all the lactic acid species are flavor-producing germs, hence we ripen cream to produce flavor. One of the chief defects we find in winter milk is the scarcity of lactic acid species. Quite a common germ around the stable is the Coli Communis This is the common gas-producing germ. It is found in the intestines and in the manure, from which it gets on to the legs of cows and the udders and from there into the milk. It is also found in sewer water, and around stagnant pools of water. Another is Bacillus Subtilis, commonly called hay bacillis. We have made butter when this bacillus had been inoculated in some cream which sold six cents per pound lower than butter made from the same cream that did not contain the hay bacillus. To overcome the effects of these winter conditions, we use a strong starter of lactic acid.

Professor Eckles, of our school, made a number of tests of samples of different patron's milk, at different times of the year. On March 5th one hundred samples of milk were taken. Only 12½ per cent showed a pure acid flavor; 48 per cent an impure acid flavor, and 39½ per cent rapid decomposition of tho curd. On April 8th 50 per cent with pure acid flavor; 27.7 with impure acid flavor, and 23.3 per cent rapid decomposition of the curd. On May 10th he found 90 per cent with pure acid flavor and 10 per cent impure acid flavor; on July 13th he found 90 per cent with pure acid flavor and 10 per cent impure acid flavor. We also found a lot of milk last winter which seemed to contain bacteria that had the power to coagulate the milk without souring it. A lot of this difficulty might be obviated if the patron exercised more care in either brushing or washing the udders before milking, and saw that the milk was removed from the stables as soon as it was drawn, Also the first stream of milk should not be put in the pail, as the few drops of milk left in the teat after milking make a favorable place for the growth of various species of bacteria.

A case of this kind was related to me where a farmer was having trouble with bad flavors in the milk, but could not find out the cause. He was advised by a certain bacteriologist to milk the first stream on the ground and the difficulty was removed.

Many of the conditions I have just mentioned are largely responsible for the lack of flavor in butter during the winter months. The improper ripening of cream is another cause. In the natural ripening of cream the fermentation is due to a variety of organisms that gain entrance into the milk and cream from the time the milk is drawn until the cream is churned.

When cream is ripened by a starter, we attempt to control the fermentation by adding a large number of bacteria of a kind that we expect will give us the desired flavor. Lactic acid seems to be an important factor both in butter and cheese making. In cheese we find about ninety-six per cent of the germs to be acid germs. In well ripened cream we find from ninety to ninety-five per cent.

The butter that scored the highest on flavor at the National Convention last winter, in one of the largest butter contests that I presume has ever taken place, was made at our School, and scored 48.5 out of a possible 50 on flavor. There were 497 competitors from all the leading states. I might say that in that contest, when the three judges had scored for four days, eleven tubs were selected from which to pick the sweepstakes. Out of the eleven three were from our School at Ames College, made in three consecutive days. This would either indicate that our boys had a streak of good luck, or that they largely had flavor under their control, as some of this milk was two days old before it was separated. Also at our state contest, previous to that, the two highest scoring lots of butter were made at our School.

We found at the Genessee contest this summer, which continued six months, that two of our boys ranked high. One won first place, with an average score of 97.79 and the other second place with an average score of 97.62. This contest took place at Chicago for a diamond medal and $100 added each month to be divided pro rata among the ten highest scorers. This brought out 127 enteries from the leading buttermakers of the West. Again at Kansas this fall where there were 130 entries, the first and second places went to two boys from our School, whom I had sent out the past season. In our experimental work, when we divided the same cream into different lots and ripened to different degrees of acidity, we found it possible to make a difference of as much as five points in the flavor.

The temperature at which cream is ripened is not a very important factor, at least not as important as is generally supposed. We have made excellent butter ripening at 90°, and again had equally as good butter ripening at 60°. If I were going to give any set rules for temperatures for ripening cream, I should say about 65° to 70° for the summer months, and from 70° to 75° for the winter months. It is not so much the temperature the cream is ripened at, as the degree of acidity it is ripened to. I would advice ripening to .60-65 of one per cent. of acid. When ripening is carried beyond .70 of one per cent we are approaching the danger line, and sour butter may be the result. This will depend somewhat on the thickness of the cream. For instance forty per cent. cream would contain twice as much fat as twenty per cent. cream, and less milk serum, consequently could not develop as much acid without endangering the flavor. I saw possibly one of the best buttermakers in the west fail at the National last winter with butter of this kind. He had carried the ripening to .75 of one per cent.

Butter fat has no flavor in itself, so to speak, possibly not more than tallow has. We depend largely on developing our flavor from the milk serum in the cream. The high aroma is possibly due to the breaking up of the milk sugar by the lactic acid species, and is possibly a by-product of the same.

We use what may be called the fermentation test for selecting milk for starters and for our cream. We take twenty or thirty samples in glass jars of about a pint each from different patron's milk, and heat them to a temperature of 80 degrees and allow them to our. Good pure milk will coagulate solid without any pin-holes, and sour with a plea-

sant acid taste. When we find milk of this kind we are satisfied that we have the right kind of bacteria present to produce a good flavor. We add a few cans of this kind of milk to the cream without separating.

We then skim as heavy a cream as we possibly can. If there is any taint present it mostly passes off in the skim milk. Thus we are concentrating our fat and depending largely on the whole milk added for flavor. I prefer a 25 to 30 per cent. cream in the winter for making high flavored butter.

Another essential point in the winter is to have a good starter. It is about as important to have good starters as it is to have good seed to sow. The common theory of preparing a starter is to select a can of good milk and skim the cream from it, and let it stand at a temperature of 85° to 90° until it sours. This would be all right provided you could tell what kind of bacteria was present in the milk, but this you cannot do. Hence you do not know what kind of flavor it will produce.

The only difference between this method and our method is, that when we find a sample that sours with a pleasant flavor and is free from taint, we pasteurize a can of our best milk by heating it to 155°, and after keeping it at this temperature for twenty minutes we cool it back to 80°, and then inoculate it with the best sample we have among the number selected in the different jars. Starters of this kind can be carried forward for a month or so without any danger by pasteurizing the new lot each time, and then adding some of the previous day's starter.

Buttermilk can also be used for a starter, for a week or so at a time, when a good starter has been added to the cream to commence with. The principal objection to it is, if there is any taint in the cream it is transmitted to the buttermilk, and increases from day to day as the buttermilk is added.

The Douglass' culture has given better results than any commercial starter we have ever tried. If you have a good starter do not be afraid to use a good per cent. of it. I would advise using from 15 to 20 per cent.

The common theory used to be that when cream assumed a smooth, granular appearance it was fit to churn, but this is not always correct. I will say, however, that when cream is ready to churn it will always have that smooth, granular appearance. I presume that some of our prominent buttermakers have observed the condition of their cream when they have made some extra fine butter, and found it to have a nice, smooth, granular appearance, so this has been handed down to us as a test when cream was ready to churn. I have seen cream have this same appearance when it was not near ripe enough to churn. Good ripened cream should have a sharp, biting, acid taste, but pleasant.

The majority of you, I presume, are familiar with the principles of the acid, or alkali test. To those who are not, I will try to explain. We have two tests on the market, the first by Prof. Mann, where a one-tenth normal solution of caustic potash is used. The other is in the form of alkaline tablets, and was first introduced June 3, 1891, by A. W. Stokes, of England. These tablets or pellets are composed of carbonate of soda and phenol-phthalein. The number of pellets used gives in tenths of per cent. of lactic acid, the acidity of the milk. The principle of the alkali test is an old one, that an alkali will neutralize an acid or that an acid, will neutralize an alkali. By adding one to the other we can bring them to a neutral state where they are neither acid nor alkali. This is what chemists call "titration." Some liquids are acid; vinegar is an example. Others are alkaline; limewater is an example. Others are neutral, neither acid or alkaline distilled water is an example of these. Now if we take a given quantity of vinegar, which is an acid, and slowly pour in the lime water, which is an alkaline, the alkaline lime water will gradually neutralize, that is, overcome, the acid, and a point will be reached where the mixture is neither acid nor alkaline but neutral. If we continue pouring on the lime water, the mixture would of course become alkaline. Now if we wished to know the amount of acid in the vinegar, we could find out if we know the strength and the amount of lime water used. If we had two kinds of vinegar we could tell which was the stronger by the greater amount of the alkali required to neutralize the acid in it. In other words

we can measure the amount of acid in one liquid by the amount of alkaline liquid of constant strength required to neutralize it. It is necessary, however, to be able to tell when just enough of the alkali has been added to neutralize the acid.

There are some substances that are of one color when in the presence of an acid and another color when in the presence of an alkali. By using some of these we are enabled to determine the exact time when a liquid is being changed from an acid to an alkaline condition.

One of these is phenol-phthalein. In the form of a liquid this chemical is neutral and of the color of water, but when exposed to an alkali it changes to a red color. If a few drops of a phenol-phthalein solution are placed in a liquid containing acid, and if then an alkaline liquid is slowly poured in, as soon as the mixture becomes slightly alkaline it will turn pink because of the phenol-phthalein contained.

With the Mann test a burette holding 50 or 100 cubic centimeters is used. There is a scale on the side of the burette something like that on the neck of a Babcock test bottle.

The basis of the test is to take 50 c.c. of cream, add a few drops of the phenol-phthalein and slowly mix in the alkaline solution. When the cream assumes a permanent pink color read the scale on the burette and see how much of the alkaline solution it has taken. The reading does not indicate the per cent. of acid but the number of c.c. of the solution it has taken to neutralize it.

If the per cent. is desired multiply the number of c.c. of alkaline solution it has taken to neutralize the acid in the 50 c.c. of cream by .009 and divide by 50 and the quotient will be the per cent. of acid.

In 1894, Professor Farrington, of Wisconsin, introduced a tablet that is very simple and quite practical. With this test five tablets are used in a glass cylinder. The cylinder must contain 97 c.c. of distilled water after the tablets have been added and dissolved. These tablets contain the phenol-phthalein which acts as an indicator so as to give the solution a pink color. The solution is mixed in a glass cylinder that has a scale on one side. Each c.c. on this scale represents 1/100 of one per cent., so when the cream assumes a pink color, by reading the number of cubic centimeters it has taken to neutralize the acid, you have the per cent. at once. For this test 17.6 c.c. of cream is used instead of 50 c.c. as with the Mann test. If this test is used I would advise using two cylinders, as it would take from 60 to 65 or about that to test the cream of a morning. The remaining solution could be poured into the other cylinder and corked tight for the next day.

In using any of these tests great care should be taken that the solution was kept air-tight, as it weakens very rapidly when exposed to the atmosphere. With the Mann test we usually use a 25 c.c. pipette and multiply the reading by two, which gives the same result, thus saving half the amount of alkali solution. We have found some little variation in the tablets.

If some of our chemists would compound a large tablet of carbonate of soda that would be equal to 100 cubic centimeters of one-tenth normal solution and use a burette with the number of c.c. marked on one side and the per cent. on the other, it would be an improvement for practical purposes over the solution or the small tablets, as there would be less chance for an error with one large tablet than when so many small ones were used. We would get closer reading with the burette than when we used a cylinder, as the diameter is much smaller in the former. The test is sure to come into general use. The progress of dairying demands accuracy all along the lines.

Mr. Woolley: It has been said three or four times since this convention began that the proper parties interested in the question before the convention are not here, and that is, of course, true. The patrons of these conventions are farmers; this meeting is chiefly represented by experienced manufacturers of cheese and butter. It seems to be a question throughout the country as to the turnipy flavor and why farmers still continue to deal in turnips. That question is easily answered from the farmer's standpoint. The farmer can grow the turnip crop more economically than he can any other root crop. Another ques-

tion is the whey. Sixty per cent. of the factories of this Province are returning the whey in the cans, and ninety-nine per cent. of the women say that they would rather wash the cans with the whey than with the milk. The patrons say that the cans are less abused coming back with the whey, and I add that this is true. I am sorry that there are not more patrons at this convention. How to reach them is the question I cannot answer. We make progress slowly, and unless we can reach the patrons, I am afraid we will continue to make slow progress. Farmers should be taught that, although the crop of turnips are easily grown, they must not be used to feed milking cows. (Applause).

Mr. T. C. Rogers: I have been greatly interested in the two papers that have been read—I am pleased because of the teaching and experience they advocate, which agree exactly with my own. I am pleased, also, that I do not require to go back to my class in the Dairy School and alter the teaching I have been given on account of anything that has been said here. The starter recommended by Mr. McKay, I find to be all right; and in regard to the different temperatures at which cream should be ripened, I find from experience, that the temperature has not much to do with the flavor of the butter. Certain temperatures are advisable when we consider the ripeness of the cream and the length of time the cream has to stand before it is churned, say 20 hours. I believe that a higher temperature is most practical to the butter-maker where he has good facilities for cooling the cream, but it is not advisable to have high temperature unless the butter maker is prepared to take hold of that cream and control it; otherwise too much acid will develop. It should be cooled immediately after showing signs of thickening, and reach the proper temperature two or three hours before churning. When we hold the cream two or three days we cool to 55° and use about 6½ of starter to each thousand pounds of milk separated. That is about 20 per cent. of starter in the cream from a thousand pounds of milk—that is calculating 12½ per cent. of the milk as cream. Mr. Smith referred to the working of butter. I think the safest plan for every buttermaker is to examine the butter, and if he finds it mottled or streaky it is a sure evidence that the butter has not been worked enough. If the maker has found that, I do not know but it would be wise to experiment a little a find out how much less working he could give that butter and still have it even. The less work the butter receives no doubt it will have a better grain. The temperature of the butter when being worked has much to do with the appearance of the butter when finished. If the butter is too cool, you are more apt to have mottled butter. If it is too warm it will hardly stand enough working without making the texture or grain of the butter greasy. About 63° is the proper temperature in summer and 56° in winter. I would like to have our butter inspected by some government official before it leaves this country, who should report back to the buttermaker the condition of this butter and suggest remedies when there are defects, and in that way we should have useful instructions coming back to butter-makers, and they would then know what to do. At the present time when the butter passes out of the butter-maker's hands he hears no more about it. I heard a man say that a great many of the butter-buyers do not help the buttermakers, and they do not give the necessary instructions that they ought to give. Some of them do not care so long as it passes out of their hands all right.

Mr. I. W. Steinhoff: I would like to ask Prof. McKay if some experiments have been conducted as to the making of butter from pasteurized cream and unpasteurized cream, and what was the result of these experiments?

Prof. McKay: We have been carrying on some experiments of that kind, but we got no benefit from pasteurizing of cream; we got about the same results from each. Our cream was scored a little higher in aroma. We tried a test at the Omaha exhibition. We took the milk two days old and pasteurized it—it scored 97. In that case pasteurizing improved it.

Prof. Dean: Do you think there would be some improvement in the winter time; these experiments you refer to were made in the summer.

Prof. McKay: Yes.

A Member: Does pasteurizing affect the body of the butter?

Prof. McKay: No. I am aware that there is a bulletin that it does. We sent 25 different lots of butter to New York and they were scored by Healey. There were only two cases where butter was marked off in body; one was from pasteurized cream and one from raw.

Mr. McLaren: Did you ever make cheese from pasteurized milk?

Prof. McKay: Yes, by using a starter. I think the winter is the time to pasteurize, if we could get our milk in proper condition. I am not in favor of pasteurizing, but with the different things we have to contend with in making butter I think pasteurizing would be of some benefit in winter.

Hon. Mr. Fisher: Do you find any difference in the keeping?

Prof. McKay: Our pasteurized butter kept the best. We tried the test in June, and sent the butter to Boston and had it scored by Douglas; one scored 97½, and one 97. The raw cream scored the highest. We kept it at 50 or 55°. For the first three or four weeks there was practically no difference, but after that the raw cream butter went off very rapidly. While the pasteurized cream butter did not keep perfect in flavor, it kept much better than the raw cream butter.

Mr. I. W. Steinhoff: Has borax, as a preservative in butter, been found beneficial?

Prof. Robertson: The use of preservatas of various sorts, mainly composed of borax, is very common in the foods used in England. Nearly every creamery in Australia and New Zealand, use large quantities of preservatas in their butter. I have used preservatas in butter very often as test work, and I find the butter will keep its flavor very much better when a small proportion of preservatas is used, than it will when nothing but salt is used. There was a prejudice in England for a long time which took the form almost of protection in favor of the home product, that preservatas was an adulteration, but the courts have held that one per cent. of preservatas may be used without any fear of being an adulteration. In experiments we found that one-fourth of one per cent. of preservatas add to the keeping qualities of butter very much, especially after the butter is taken out of cold storage. Preservative consists of 90 per cent. of borax and 10 per cent. of salt. I am not prepared to advocate its use in Canada. I think we have gone too far in boasting that we have used nothing but salt as foreign matter in butter. The high grade butter in England has no salt in it, and it might be well for us to make further improvements—if it is an improvement. With regard to this matter of flavor, Prof. McKay was one of my students 22 years ago but has made considerable progress since that time. In talking of his standard for flavors, I wish to say that everybody goes to the standard the Englishman appoints. It is his standard that he will pay for, although the man in the United States may have a preference for some other standard. That is not the standard from butter made from pasteurized cream. The Englishman's taste has been educated to butter that has not been made from pasteurized cream. The composite flavor of butter comes from three sources: From the cream. A large proportion of the highest priced butter in England is made from perfectly sweet fresh cream, that has no fermentation at all about it. Then another flavor comes from salt, and another flavor comes from fermentation. Now, the fermentation that the Englishman likes is the fermentation that comes from a whole lot of bacteria in the cream; he has been accustomed in the old days, to like butter that is made from milk from cows that are perfectly healthy, and from milk that is set in a dairy that is perfectly clean, a dairy building where there is no bad smells. If you have a dairy building where there is no bad smells, you may be sure that there is no such bacteria there of a vile sort for making a bad flavor. The bacteria that is in the air of a nice, sweet-smelling dairy building will fall on the milk and that gives the flavor the Englishman likes. I have made butter from pasteurized cream and had a special starter, and I have taken some nice sweet milk exposed to the air of a clean dairy, and used that as a starter, and that composite starter gave a flavor that was rated higher, every time, than the flavors from these special cultures. So that, if you have cream that has been exposed to the air of a stable or barn, pasteurize that cream to kill the bad things that are in it, but if you have not any bad flavors in your cream then do not pasteurize it to kill the good things.

One word as to the turnip question. That is a live subject, especially around Guelph, where, if a man does not know how to grow turnips he is a duffer. The reputation of this district for fine stock is, I think, a little more due to the turnips than to the man, and that is not saying anything against the man who has the sense to grow turnips. When we began to improve our cattle, that was when men learned to grow turnips, and I do not know that you could have the one without the other. I would have turnips on every farm where stock is kept; otherwise you cannot grow stock. If you find the turnips give an objectionable flavor to the cream, you can grow on all farms as large a weight of improved short carrots as you can turnips, and they will make better milk than any other root you can grow; but they are not as good as turnips for feeding your beefing stock. Therefore I would feed my carrots to the milking cows, and my turnips to the growing cattle and cows that are not milking.

We appreciate very highly that spirit on the part of Canadians who have gone to the States, and that is the way we have of subduing the country; we are doing it gradually, and in a kindly manner. We would rather have our ideas prevail, than our laws in their country. We are glad to have these people come here and give us the benefit of their best thoughts, and then when we go over there to get an equally good reception from them. If you want to have a government inspector for butter, I would advise you to have his office near the line, and have it where he could skedaddle, for safety, whenever he sends back the wrong butter.

Mr. McFarlane: How long did you feed turnips and carrots to see which was best?

Prof. Robertson: About thirty years. I have looked over about 500 herds of cattle, with a good deal of care I have examined them in England, Scotland and Ontario, for the purpose of finding out how the best herds were kept. The best herds of Ayrshire I know of, that make the farmers money, and help to lay something up, were fed for three months of the winter on turnips; but when the milk was sent to Glasgow the people would not buy it, and therefore the farmers learn to grow carrots and they say the milk is better.

Mr. McFarlane: Last winter I fed the cows equal proportions of turnips and carrots, and they were just as well without the carrots as with them.

Prof. Robertson: The question is whether an equal weight of turnip tops or the roots will produce the most milk. I think if you feed an equal weight of turnips and tops to the cows, the top part will produce the most milk, but that does not say the top part is the best food, it has a bad effect on the cows. It is just the same as if you gave a glass of milk to one man and a glass of whiskey to another. The whiskey man will run at the mouth sooner than the milk man will, but that does not say that the whiskey is as good a food as the milk is. Turnip tops will stimulate a cow, but they should never be fed; put them on the land to help the soil and feed the cow the root.

R. A. Thomas, Barrie: Sometimes in the winter the cream has the appearance of readiness to churn, but it has not the acidity Mr. McKay spoke of. How can we develop that acidity apart from using starters? Or can we in the natural way bring on that acidity that is desirable?

Prof. McKay: I am an advocate of starters; I am an advocate of pure cultures. I suggested in the paper I read, that if you were engaged in buying a commercial culture, select some milk that will sour and coagulate solid, and have a pleasant taste and then you can make a starter. After you have used a starter of that kind a few times it becomes a pure culture.

Prof. Robertson: We use a fermentation starter either natural or artificial. These same things that start the production of flavors, will keep on and on till they spoil the flavor of the butter, if they have a fair chance. I do not know any fermentation starter which if kept going will not spoil the butter. Cold storage, which is the keeping of the butter at a low temperature, is the only efficacious fermentation starter, and the creameries of Ontario have not availed themselves of the provision that exists for putting up a cold storage at the creameries, nearly as much as the other Provinces

have. Any one sending to the Department of Agriculture at Ottawa may receive full plans for the building of cold storage rooms. There are now 200 creameries in Canada that have rooms were the temperature can be maintained at 35 degrees all summer. They do not cost much to construct, and there is $50 of a bonus given by the Government to every one that puts one up.

Mr. HODGSON, Cheese Exporter, Montreal: There has been in England a great agitation started up against the use of lactic acid in creamery butter. I have had several orders from England to ship saltless butter with ½ to 1 per cent. of preservatas in the butter. I have already shipped 100 boxes, mostly all from Quebec, and I have very high commendations as to the keewing qualities of the butter, even though there is not a particle of salt put in. Now we can send four or five hundred boxes a week of saltless butter. We must tell England this acid cry is all folly, or else we must send them what they like, and I would be pleased to know exactly what Prof. Robertson thinks about the matter; I am between two fires. England has raised a cry against using it, and prosecutions have been in force time and again, and I think Prof. Robertson should speak out as to whether the use of preservatas is right or wrong.

Prof. ROBERTSON: The statement by Mr. Hodgson that he sent butter to England with ½ per cent. preservatas in it, and that that butter has pleased the people there, is a contribution to our information that is valuable I am in no position as a Government official to say for or against the use of perservatas beyond this, that my own judgment is, and the courts of England have held, that 1 per cent. of preservatas in butter is harmless, and is not an adulteration, and that you can keep butter by adding ¼ of 1 per cent. in addition to ½ ounce of salt per lb. A few men agitated against its use, but the courts held that there is no adulteration in using 1 per cent. of it. You know that salve they use on babies' mouths—honey and borax; the babies will swallow down almost more in a day than a man gets in his butter, so the doctor says, and you cannot call it injurious to the health.

A MEMBER: How is preservatas used?

Prof. ROBERTSON: It is used in the form of a powder, and mixed with the salt and put into the butter that way. I have used it in that way, and four months after the butter was made it tasted as if it had not been made more than four days. A half ounce of salt and ¼ of 1 per cent. of borax with one-twenty-fifth part of an ounce of preservatas are the proportions I used with so much success. One-half ounce of salt per pound ¼ of 1 per cent. of preservatas is equal to one-twenty-fifth part of an ounce to the pound.

THE FARMER OF THE FUTURE.

BY DR. BEARDSHEAR, PRESIDENT OF STATE COLLEGE OF AGRICULTURE, IOWA

I have found wherever you meet a Canadian, whether in the United States or at home, he is a man who keeps you awake in every particular. Our esteemed friend, Professor Robinson, has pleasantly and magnanimously referred to your adept method of conquering the world by the light and truth of your institutions. It takes something of a man to be willing to be thus mastered. Eight years ago when I began work as president of a college in Iowa, Mr. Wilson, now the Cabinet Secretary of Agriculture in the United States, and I, came here to visit your college to get a few pointers, and we secured good ones. Both from your colleges and farms you send out men whom it is a delight to meet. In behalf of the Province and the Dominion, represented by the magnanimous hospitality of the President of your Agricultural College, we have shared the good-natural opening of your tables and the good things of your heaven and your earth. This is the spirit that makes the world kin, and one for which you are noted. I begin my address with two

statements : The success of the farmer of the future depends more upon mental than upon manual labor. Our American sage, Emerson, has said "The truest test of civilization is not the census, nor the size of the cities, nor the crops ; no, but the kind of men the country turns out." There are several kinds of farmers. First there is the man who lives anywhere and farms the farm in whatever manner possible. There is the man who lives in town and spends his money upon the farm as a kind of accomplishment. Then there is the genuine original farming stock that lives on the farm and takes matters as they come and makes the most of them. I wish to speak of the farmer in this original sense. Any calling that has not a future is indeed lamentable. It has in it discouragement for the youth at the outstart, and disheartens the one who has spent his vigor and energy to establish it. I believe a bright and better future awaits the intelligent farmer. The very thrift of our leading American farm industries in the Dominion and in the States, like that of the cheese and butter industry, is an admirable ecomium on the physical condition of these regions. For example, the Laplander must look to his reindeer, the roving Tartar to his mares, the Bedouin of the desert to his camels, for dairy products, because the physical conditions of those lands will not support a better dairy animal. The pastoral tribes of different countries must look to the sheep, others in the rocky regions to the goat, and a great many in the swamps and jungles of tropical climes, depend upon the buffalo as a milk yielder. But with the rich resources of North America the cow has become supreme as the source of untold wealth and blessings. The time was when the markets of the world were utterly controlled by the production of cotton, and "cotton is king" became a proverb with the nations. As the rich lands of the corn zones gave up their life producing forces in response to the brain and hand of man, corn gained sway in the marts of the world, and everywhere there was the proverb "corn is king," but with the coming of corn and the further improvements of the farming communities, with improved implements of agriculture, with new methods in animal industry, there have come into the marts of the world through great commanding forces of trade, a number of different industrial supremacies, any one of which, in a very important sense, you can say is supreme, as the cow is queen, or the hog is monarch, and so on, to the credit of those two most matchless agricultural countries in the world.

In the science of teaching they have what they call the new and the old education. In the industry of farming there are now the old farmers and the new farmers. We are in the marked transient from these old methods to the new. In these new experiences we are liable to misunderstand each other as college men and as farmers. In the Dominion as well as in the States farmers used to look at the college professor as a kind of strange animal coming down from an unknown region. There were mistakes on both sides . The college man did not know enough about his science, and the farmer did not know enough about his farming, so that both could have the simplicity of greatness of knowledge. The college and the farm are coming in more easy touch and acquaintanceship with each other. The highest outcome of science in the college and common sense of the farm will be the uncommon sense that will come to the farmer who reads, thinks, experiments and understands these new lights of science upon the fields and in the barns. This convention is an excellent example of this spirit. We have studied mutually the laws having to do with fertilization of the soils, the principles that have to do with foods and the proper feeding of animals, the methods that bear upon the curing of the cheese in the curing rooms and the flavors and perfections of butter, and the discoveries in the wonderful field developed under the microscope in the region of bacteriology. As many times as I have looked at the results of the microscopical investigations, I sat in wonderment as these investigations in the varying conditions of cheese were set clearly before us upon canvas by Prof. Harrison. That we could sit here in this room, hundreds of us, and see very intelligently the results of these experiments, is really wonderful. So the farmer of the future will understand and apply much more readily all these discoveries of science that bear upon his calling.

The governments of the Dominion and of the United States, in connection with their experiment stations, agricultural colleges and universities, are doing a most excellent work for agriculture and the knowing farmer of the future. You remember the motto of

the Royal Agricultural Society of Great Britain is "Science with practice." These great governments combine this science with practice, and the advantage of finding out first how much of this practice would be practicable to the home farm. They take careful knowledge of what animal products are suitable for foreign markets, the best methods of preparing for these markets, and making experimentations in opening the new industries along the lines of agriculture.

Questions like the sugar beet industry are gone over long before practical introduction by the farmer to determine what would bo advisable and serviceable. Men who have been educated scientifically by the agricultural colleges of these countries are sent out and often located in foreign countries with a view to selecting what would be the most desirable in plant and animal. Tests are made with reference to certain markets, like the Canadian and American butter and cheese upon the London market the last few years. The questions of the farmer's home and of domestic science are fostered and developed. Inspection of live stock in transportation from disinfected districts, like cases of Texas fever, etc., are carefully looked after. The meats that are sent out to home and foreign markets are carefully inspected by scientific experts. Diseases that prey upon domestic animals are studied, and preventives of anti-toxine preparations are established or proved useless. Climate and crop bulletins do much to help in the growing seasons through all departments in question. The observation of the weather service and the use of storm signals are working a great benefit to the agriculturist. Vegetable pathology and physiology have brought much information for the remedy of diseases affecting the various crops like those of wheat, garden plants, tobacco, potato, and the fruits of the land. Zones for corn, wheat and oats are established with an intelligence that is trustworthy, that will save many useless endeavors in districts not suitable for these crops. Fibre investigations are made with learned skill, with a view of determining the quality and geography of hemp and ramie growths. Careful study is made in the chemistry of typical soils, with a view to obtaining data that will serve as bases of scientific knowledge in the raising and handling of crops. The constitutents of these soils are studied with a view of determining how the defects and impoverishments of each can be remedied.

In etomology investigations are employed for the determining of injurious insects that prey upon various products of the soil. Investigations like that of the San Jose scale prove of world wide interest and most helpful utility to the fruit men The questions arising regarding the ravages of the weevil, the Hessian fly, and the chinch bug prove of vital moment. Inquiries in regard to the building of country roads, and the experimentations with these roads at the various agricultural colleges, is helping on the establishment of good roads in the country districts. Agrostology, or the science of grasses, is doing a vast deal in the introduction of new grasses and the solution of forage problems in the more arid regions of both countries. The measurement of soil moisture is throwing much light upon the cultivation of crops, the effect of the seasons upon the different soils, and the wisest methods to be employed in their cultivation afford researches. The experiment stations take up these questions with a view of studying them locally, and of adapting the varied problems to the respective states and provinces in which they are located. North, South, East and West, these problems are very much modified by geography and climate. They all demand the most technical knowledge and accurate skill. They rank with the most difficult problems in medicine, and surpass any that arise in the fields of law and theology. They have assumed formidable proportions only in the last fifteen or twenty years, but in thirty years, from now throughout the Dominion and the States there will be a number of trained scientists in the state, provincial and national governments of most scholarly attainments of thorough scientific accuracy and ability, and of consequent renown for distinguished service to the farmer and to the tillers of the soil throughout the world. The farmer of the future will be ready to catch pace with these steps of magnificent and beneficent progress.

The young farmer has been led to believe that the most money could be had in mines, stocks, railways or something aside from his farm. There is a great delusion in this. The safe, honest and solid money of the country is made in great part from the

soil of the farm. It is said that much less than ten per cent. of the merchants of any great country continue throughout their lives without failure. Unfortunately I have not the statistics of your Dominion at hand, but I know that the cheese output of your country is about sixteen millions dollars a year. You could take the products of any one of these provinces and find most striking illustrations of the superiority and advantage in money making on the farms over mines, stocks and railways. Not for the purpose of boasting of my own state, Iowa, but for illustration I use the following figures. You could doubtless equal them with one of your leading provinces. For a single year the value of the animal product of Iowa oxen and other cattle, not including cows, exceeds the total gold output of the United States for a year over $14,000,000 ; the swine of Iowa for a year exceeds the gold output over $22,000,000 and the Iowa horses surpass the gold yield $50,000,000. The Iowa corn crop for a year exceeds the total anthracite coal output of the United States by $18,000,000, and almost equals the total gold and silver output of the entire United States. It exceeds by a million of dollars the entire imports at Boston, Baltimore and New Orleans for a year, and more than covers the cost of original Pacific Railroad, which amounted to over $94,0000,000. The Iowa butter product for a year exceeds the total gold output of the United States, the total petroleum of the United States, and twice the natural gas production of the nation. The Iowa hay and corn output more than exceeds the total gold, silver, lead, zinc and quicksilver output of the entire nation for a year, and the gold production of the entire world for 1899. Iowa hay, oats, corn and wheat for a year amount to more than double the dividends paid by all the railroads in the nation for 1891. The hay and the oats crops exceeds the total cotton crop of Mississippi and Louisiana.

This shows that the farmer of the future will have use for all of his head in order to make the most out of his farm, for these large money values will require a strong brain as well as a sturdy hand. An additional effect must here be taken into consideration. The success of all callings is now turning upon small precentages. Even the great corporations, whose concerns amount to hundreds of thousands of dollars, count their profits by small margins. This is becoming strikingly true in farming. We heard in figures here to-day how upon a considerable production of cheese and butter products, $670 could be gained by scientific knowledge and careful figuring. Upon these small precentages will rest the prosperity of the farmer of the future. You go back into your neighborhood and you will find that in the last twenty years, while you by reading of agricultural papers and the employment of the recent methods of agriculture have prospered, that just across your fence or a mile away you will find here and there men who have been behind the times so long that through these years they have had to struggle for a mere existence. The man that keeps awake to the freshest knowledge, the best methods, and good sense is going ahead in the race of farming of the man who is content with the principles and methods of his grandfathers.

The farmer of the future will have not only a practical education, but also a higher education, placing him on an equal rank intellectually with the men in the professions to-day. There is a wonderful movement in all Anglo-Saxon countries for the higher education of the man who works with his hands. This is a logical and beneficent outcome of our higher civilization.

We speak of the power of man through law, and the majestic system of philosophy and jurisprudence which has built up through the ages. We consider with a deep reverence the profession hoary with age that has brought the healing of heaven to man and his earth, through the skilful hand of the physician ; with deepest revence must we pay tribute to the man who has more than carried out the sentiment, " If anything is greater than God seen in the sun, it is God seen in Homer," have brought the councils of the Almighty home to men's business and bosoms, and made God seen in man still greater than when in Homer. But think of the power which the educated farmer of the future shall find back of the material side of this calling. In animal husbandry for instance there is the highest intellectual demand of all the thought, of all the common sense, and of all the philosophy he can command in handling the laws fundamental to stock-breeding-heredity, variability and selection.

What a charming mystery in the power of a cutting or even a leaf of a plant to awaken from its few dormant cells a growth and completed structure with the marks of the mother plant. What a marvellous power under the direction of man, the potency of the bull Favorite or the Black Arabian stud to imprint himself upon his kind for generations to come.

In the sixteenth century, when heresy hunters were more frequent than now, a poet, John Huntington, wrote up the genealogy of heresy as follows:

"Blynde Obstynacye
Begate Heresys
By a myschaunce,
Of dame ignorance.
Heresys begate
Stryfe and debate.
Debate and ambycyen;
Begate Supersticyon,
Supersticion playne
Begate disdayne;
Dysdayne of trowthe
Begate sloythe.
Slowthe and sluggyshnesse
Begate wyfulnesse.
Wyfulnesse, verelyle
Nygh cosyne to heresye,
Begate myschife,
Father of Wyclife,
Which ded brings inne
His grandfather Synne."

In the work of agricultural education, whatever its source, this same "grandfather synee" creeps in, and this great law of heredity makes the stock-breeding orthodoxy expect the transmission of splints, ring bones, under sizes, vitiated constitutions and other weaknesses of the various domestic animals, but happily at the same time enables him to breed them out of the coming generation.

And what a law is that of variability in breeding animals that enables a man to breed where the fats are going to be placed; what kind of hams and steaks will be ready for the butcher's block; whether foods shall make milk or beef; whether you will have long wool or short wool on sheep; whether it shall be small or large; whether a horse shall be large, small or medium, and how fast he will travel; whether a cow shall have horns or no horns at all, and a dog have a long or a short tail; the place in which a pigeon shall have a tuft on its head, what kind of eyes it shall have, and the color of its feathers; what will secure one hundred and fifty varieties of pigeons from one rook pigeon, and so on "ad infinitum, with little fleas to bite 'em." Darwin says, "We may smile at the solemnity of this precept, but he who laughs will win no prizes."

Then there in the law of selection, which, if it does not fully determine all the philosophy of our nursery rhyme, "Bah, bah, black sheep, have you any wool?" does decide whether it shall be all white instead of black, and multiplies the bags full. The law of selection believes the orthodoxy of the poet:

"A thing of beauty is a joy forever,"

and embodies it in each new generation with the matchless artist of holding the hand of the breeder pupil in his, as did the writing master of our boyhood days direct our hands in tracing his copies until nature's own skill appears in exquisite form and lovliness.

The time would fail me to dwell on the laws that make from thirty to forty bushels of wheat per acre grow where only ten to twenty grew before; that produce sixty to ninety bushels of corn per acre where twenty-five to forty formerly grew; that enables the farmer to determine the quality of milk by the butter fat produced and not by quantity; that harness centripetal and centrifugal forces so as to skim milk within five minutes after it leaves the cow, thereby securing one-sixth more cream than the old fashioned way of skimming; that enables him to make twenty cent butter instead of twelve; that will enable the farmer to haul his milk to the creamery in the early morning and return in a brief time with his skimmed milk and a check in his

pocket for the butter. The laws that will take the wild sand cherry of the Dakota plains and share its vigor with the more luscious fruit of a tender growth, resulting in a fruit with the hardiness of one and the flavor of the other; that will take the pollen of the wild rose or the wild rose of Russia and cross it with a rose of composite petals with the resultant of a tonic of a wildness in a new rose, a greatly equalized beauty of them both, and a fragrance fit for the heavens; that will take the wild crysanthemum of the far East and develop it into the hundreds of varieties of exquisite beauty and delicate perfection, making possible the wondrous exhibits of floral art in our large cities, and thrilling our homes with sweetness and light. The elder Herschel, discovering the wonderful laws of the heavenly bodies, and their remarkable responses to his calculations and inventions, exclaimed, "O God Almighty, I think Thy thoughts after Thee!" But an up-to-date agriculturally educated man can in deepest reverence, as he sees these new creations of wonder and immortality in plant or fruit or flower exclaim, "O God Almighty, I make new creations with Thee that shall live while the hand of man is kindly to utility and to beauty."

There is another thing. I believe that the farmer of the future will have better confidence in himself and in others than he has had in the past. When a man knows more than a little he gets sense enough to believe in himself and in his calling, for he can gauge himself and his work by other men and their work. This will make a more cheerful farmer. I like the expression that was dropped during this meeting stating that a man who works successfully in a creamery or cheese factory is always a cheerful man who has his heart in his work. I fear a good many of us farmers have grumbled away many dollars in the past. We have had fits of blues that have cost us in dollars and cents as well as in vitality. We have complained of everything in the world and in heaven, until if some of us could hear through the phonograph the grumblings of the past we would either be ashamed of ourselves or be in a poor condition to live. At the Trans-Mississippi Exposition at Omaha last fall a leading packing firm represented the disposition of a whole pig when every part of it was prepared for the market and exhibited in a glass case. In a phonograph close by they had its dying squeals, so that they preserved the pig squeal and all. The grumblings of our past have made too large a space on the shelves of our profits and losses. The farmer of the future will remember that God has put his eyes in the front of his head for a wise hint. If the Lord wanted so much of complaining over hard places already past he would have given man some kind of an orbit by which he could have taken in things from other directions. But the fact that our eyes are in the front of our faces should have the effect of making the sun-rise caught early by us as it comes over the sea for a better day, even though the one before it had something of a hard knock and look. By this spirit the farmer of the future will secure a better life and a nobler existence.

The outcome of farming, like that of every undertaking, must be above the mercenary interests of a calling in the man and his home. As stated by the quotation of the sage in the beginning "the test of civilization is not in the census nor large cities, nor big crops, but the kind of man the country turns out." I like the environment of the farmer's work and home. I enjoy the piece of bread cut clear across the loaf with country butter snow deep, together with the things that come from the very factories of the freshest thoughts of God to encourage the appetite of man, giving his heart gladness and his muscles strength because he has worked with God in the field. I love that spot out in the field and under the free sky, "be it never so humble" as a home where you have the honey of the flower and milk that comes from the cow with a relish peculiar yet indescribable, because it has the aroma of heaven upon it and has never tarried by the rivers of waters for its refreshing, as it does sometimes in the city.

I know I shall go back to my work having received from you an inspiration that will make the year of the College now beginning soon much brighter, and I hope much more invigorating to the young men and women about me. Since coming I have realized that the proverb which we have in the United States: "Blessed is the man who blows his own horn," after all did not originate there but originated here in Canada. All this talk

about pulling the feathers out of the eagle's tail and making him scream, and jumping upon the lion and twisting his tail, may do for politicians, but I have never seen more loyalty to the American eagle than when I see that you hold up here as the best possible representative of the cheese and butter interests of Ontario such a magnificent specimen of that bird as I behold in the president's chair, Mr. Harold Eagle. (Laughter.) Judging by the way he is conducting the meeting, and the spirit of you all here to-day, I am sure that deep down in your hearts, as deep down in mine, we can mutually feel that if a change of countries came to be a necessity with either one of us that I could say for my part: I would choose to dwell in the Dominion of the woman whose virtue, whose nobility, whose character, whose domain of soul has made her in heart as in hand Empress of this vast world of Great Britain, Queen Victoria. (Applause.) And that you would probably count in such a necessity it also a privilege to come under the dominion of that magnificent and magnanimous President of the United States, who reminds you most significantly of that prairie statesman, Abraham Lincoln, who during the sad days of the civil war made himself so great that he is known the world over as a world's hero. (Applause.)

THE RESULT OF SOME RECENT EXPERIMENTS IN THE PRESERVATION OF MANURE.

By Frank T. Shutt, M. A., Chemist of The Dominion Experimental Farms.

Though there are many topics of great interest to be discussed by eminent men, I feel that it is not necessary for me to make any apology for occupying half an hour of the valuable time of this convention, in order to bring before you the results of an experiment that we have been carrying on upon a subject of the greatest importance to agriculture. In your opening address you referred to the fact that there were a larger number of cattle feeding than dairying men in this vicinity. The results that I wish to call your attention to to-day are of equal importance to cattlefeeders and to dairymen. In fact it is not only to the dairymen and stockmen, but to all who are engaged in any branch of agriculture, that this question, barnyard manure, is interesting. Other things being equal, the yield of our fields depends upon the amount of fertility in the soil. The manure that is produced upon the farm is very largely the fertility which we have taken from the soil; therefore to maintain economically the fertility of our fields it is necessary to care for manure and return it to the soil with the least loss of plant food possible. In order to study the matter systematically it would be necessary, first, to gain a knowledge regarding the nature and composition of manures that are produced by the various kinds of farm animals, and consider the conditons or influences which affect the composition of these manures as produced. The character and amount of food, the age and function of the animal, are all factors that affect the value of the resulting manure; in other words its per centage of nitrogen, phosphoric acid and potash. And secondly, it would be necessary to study the changes that are brought about in manure by fermentation. These matters, however, we cannot enter into to-day for lack of time. Information on these points will be found in Bulletin No. 31 of the Experimental Farm. We shall confine ourselves to a consideration of certain experiments recently carried out at the Experimental Farm at Ottawa in connection with the rotting of manure. In this experiment or investigation our principal object was to learn what losses took place in nitrogen, phosphoric acid and potash during the rotting of manure under two conditions, (a manure completely protected from the weather, and (b) manure rotted in an open bin, using all ordinary precaution against undue leaching.

Secondly, we wished to learn the result of fermentation upon the availability of the plant food in the manure. This is an important question, for it is quite possible to have the soil loaded or saturated with the elements of plant food, nitrogen, phosphoric acid and

potash, but so combined that they were of comparatively little value to growing crops, that is to say, were not soluble in water. I presume we are all aware that the nourishment crops take through their roots must be in solution. Plant food to be available must either be in solution or soluble in the slightly acid sap which roots exude. Plant food in other forms than these is not available for our growing crops. I can give you an illustration that will probably make this clearer to your minds In various parts of Canada phosphate of lime or apatite is mined. This mineral phosphate, no matter how finely it is ground out, is useless (because insoluble) to growing crops. We have tried it, and reached that conclusion after several years of experimenting. But treat this mineral phosphate with sulphuric acid, and it is converted into super phosphate, a most valuable, because soluble, source of phosphoric acid for crops. We desired to learn therefore whether fermentation under the conditions I have named affected in any way the availability of the plant food in the manure. Our plan and objects were as follows :

We took equal weights of horse and cow manure, four tons of each, and intimately mixed them. A sample of this mixed manure was taken and analyzed. This gave the composition of the manure at the beginning of the experiment. Then the eight tons were divided into two equal parts, and four tons were placed in a small building that was weather-proof, and compressed by pounding ; the other four tons were placed in an open bin. In this bin the manure was exposed to every rain that fell, but the sides and floors being constructed of double boarding, all due precaution against the leaching was taken. From month to month, for a whole year, we weighed and sampled both these manures. The samples were then submitted to careful analysis, and from the figures obtained we had data from which we could calculate the losses which might have occured, both in the "protected" and "exposed" manures. We should also be able from these figures to say whether the plant food in either of the manures had become more available. The foliowing chart will show you clearly the results we arrived at :

WEIGHTS OF FERTILIZING CONSTITUENTS IN "PROTECTED" AND "EXPOSED" MANURES.

	Fresh.		At the end of 3 months.		At the end of 6 months.		At the end of 9 months.		At the end of 12 months.	
	Protected.	Exposed.	Protected.	Exposed.	Protected.	Exposed.	Protected.	Exposed.	Protected.	Exposed.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Weight of manure	8,000	8,000	2,980	3,903	2,308	4,124	2,224	4,189	2,185	3,838
Organic matter	1,938	1,938	880	791	803	652	760	648	770	607
Total nitrogen	48	48	40	34	39	33	37	29	37	31
*Total phosphoric acid	25	25	25	23	26	22	25	21	24	21
†Available phosphoric acid	15	15	20	15	19	15	21	17	19	16
*Total potash	62	62	65	48	59	44	60	41	60	40
†Available potash	54	54	62	45	52	42	56	38	55	35

* Soluble in strong hydrochloric acid. † Soluble in dilute citric acid.

Let me say a word regarding the several constituents we determined in these manures.

1. *Organic matter.*—Though not in itself an element of plant food it is nevertheless one of the most valuable constituents of barnyard manure. By its decay in the soil not only is the physical texture or tilth of the soil improved, bringing about a greater freedom for root extension, and increasing the soil's absorptive power, but its contained nitrogen is converted into nitrogenous compounds which can be absorbed and utilized by growing crops. The decay of vegetable (organic) matter in the soil gives rise to humus, and humus is the soil's great store-house for nitrogen. Soils rich in nitrogen are invariably rich in humus and *vice versa*. Soils containing a fair proportion of humus do not readily dry out in time of drouth.

2. *Nitrogen.*—This is the most valuable, or at any rate, the most costly element of plant food. Fertile soils are always found to be rich in nitrogen. As we have already noticed, humus and nitrogen are intimately related and associated; in supplying the former we are usually furnishing the latter.

3. *Phosphoric acid* is an essential constituent of plants, existing in such as phosphate of lime, phosphate of potash, etc.

4. *Potash*, also an important plant food, and one which certain crops take in large quantities from the soil. Nitrogen, phosphoric acid and potash, are the elements that give commercial fertilizers their value; barnyard manure also would be valued—from a commercial standpoint—from the amounts of these constituents it contained, for humus—though of great agricultural importance—cannot have a money value assigned to it. Though there is no time to consider in detail the various functions of these essential forms of plant food, it is important that they should receive your careful study. To all who will write me I shall be pleased to send my report containing such information.

Further, in addition to determining the total amounts of those elements I have enumerated, we estimated month by month—the amounts of such as were converted into compounds more available for plant absorption. This I consider an important matter, as these constituents are of practically but little value to crops until they have been so converted.

In considering the charts, I wish, first, to call your attention to the richness of the fresh manure as produced on the Experimental Farm, Ottawa, compared with manures ordinarily found in the barnyards throughout the country.

——	Average on Farms lbs. per ton.	C. E. F. lbs. per ton.
Nitrogen	7.8	12.0
Phosphoric Acid	3.6	6.1
Potash	9.0	15.3

You will notice that there is a very great difference in favor of the C. E. F. manure. I attribute it chiefly to the greater care of the liquid manure on the Experimental Farm. We know that the liquid manure is by far the richer in nitrogen and potash, and I cannot impress upon you too strongly the desirability of using sufficient absorbent litter to hold all the urine. This is a matter in which tons of most valuable plant food are annually lost by Canadian farmers.

By referring to chart No. 1, you will notice there was a continuous loss in weight, both in the "protected" and "exposed" manures, throughout the period of the experiment. This loss was largely due to the destruction of the organic matter by fermentation. This is made clear by comparing the amounts of organic matter present, month by month. During the first three months the "protected" manure lost 1,058 lbs., and the "exposed" manure 1,147 lbs. organic matter. At the end of the year the organic matter in the former had been reduced to 770 lbs., in the latter to 607 lbs.

Secondly, there is a similar (though not so great) loss of nitrogen. From 48 lbs. in the "protected" the nitrogen was reduced to 40 lbs. in three months: in the "exposed" the nitrogen fell from 48 lbs. to 34 lbs. in the same period. Again we notice, then, the greater loss in the manure fermented without protection.

Thirdly, as regards phosphoric acid, it is to be observed that practically there is no loss in the protected manure; in the exposed manure 4 lbs. of the 25 lbs. originally present were lost by drainage

Considering the effect of fermentation upon the availability of the phosphoric acid it will be seen that in the protected manure the amount of such available phosphoric acid increased. This I deem a matter of considerable moment.

Fourthly, in speaking of potash we have again to record the fact that practically there was no loss in the protected manure. The case however is very different in the exposed manure. Although precautions were taken against undue leaching, by providing the bin with double flooring, yet nevertheless there was a great loss of this element by soakage. It must be remembered that the potash of manure exists for the greater part in the urine, and consequently is present in solution. This exposed manure lost 22 lbs. out of 62 lbs. originally present—more than one-third. It seems to me that from a consideration of this experiment we may conclude that there will always be some loss on keeping manure unless it is preserved on a cement floor. In thinking over these results I would like every farmer to ask himself if the conditions under which he rots manure are as good as those of the exposed bin of this experiment. If not, his loss of potash will be greater than that we sustained.

In the following chart we have given the percentages of the fertilizing constituents lost under the two systems of rotting, and also stated the loss in value per ton that these manures sustained. This table is a most instructive one, and worthy of your careful study.

Loss of Fertilizing Constituents in the Rotting of Manure.

	At end of 3 months.		At end of 6 months.		At end of 9 months.		At end of 12 months.	
	Protected.	Exposed.	Protected.	Exposed.	Protected.	Exposed.	Protected.	Exposed.
	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
Loss of organic matter	55	60	58	65	60	67	60	69
" Nitrogen	17	29	19	30	23	40	23	40
" Phosphoric acid	none	8	none	12	none	16	4	16
" Potash	none	22	3	29	3	34	3	36
Loss in value per ton of original manure	20c.	64c.	27c.	80c.	36c.	90c.	36c.	95c.

Value of fresh manure, $2.61 per ton.

We may now rapidly draw a few conclusions from the data we have been considering:

1. Fermentation causes loss. In both instances there was loss by destruction of organic matter and nitrogen, though the loss of these constituents was much greater in the exposed than in the protected manure. By rotting we must allow that the organic matter is converted into compounds that more readily form humus in the soil, and this is certainly an advantage. It is an offset against the loss we have mentioned.

2. There was no loss of phosphoric acid in the protected manure, but the exposed manure suffered loss in this element. Rotting had a useful effect in rendering the phosphoric acid more available.

3. Though practically no potash was lost from the protected manure, more than one-third the amount of this valuable element was lost by drainage in the exposed manure.

4. Rotting does not affect the availability of the potash; in other words, the potash of fresh manure is just as valuable as plant food as that in rotted manure.

5. There appears to be no object in rotting manure for a longer period than three months.

6. The best conditions for rotting necessitate (1) protection from rain, sun and wind, (2) a water-tight cement floor, and (3) that the mass of manure be kept moist and compact.

7. Weight for weight, well rotted manure is much richer in plant food than fresh manure.

8. Rotting manure destroys weed reeds that may be present.

Mr. WOOLLEY: Then the conclusion you arrive at, in the interest of the farmer, is that he should use manure in the green state, unless he has foul seed in it, and he should then ferment it to destroy the seed.

Mr. SHUTT: Not necessarily. For certain crops and certain soils it is better to have rotted manure, though it may not be possible to rot the manure without some loss. But I say if he is not prepared to have such arrangements whereby the manure is protected and preserved from leaching, and if he is not prepared to keep the manure moist and compact, then it is better for him to get that manure into the ground as soon as possible.

Mr. WOOLLEY: It is often said that the Government experiments are scientific. So they are, and they are a great blessing to the community. I do not suppose there is any greater science on earth than farming, and we are not as farmers able to experiment. Consequently the Government does the work for us, and it is a great benefit for the farmers to know which condition is best for them. I can readily understand that for certain crops rotted manure is more readily available for the crop. A farmer takes a field for roots and for corn. In my opinion the hoe crop distributes the manure and mixes it up with the soil and puts it into shape so that the crop readily receives it.

Mr. SHUTT: With regard to the advantages of green manure, it seems to be the opinion of most practical men that heavy clay loams are those which benefit most by green manure. There is no doubt that the soil is a storehouse which prevents loss of the fertilizing material of the manure. Clay loams are very much improved in their mechanical condition by the application of green manure. On the other hand, for light and sandy soils, rotted manures are probably the best. In working light and leachy soils it seems to be the greater economy to feed the crop rather than to try to improve the soil; in other words to apply the manure annually in the rotted condition. For such soils there is nothing better than a crop of clover plowed under. This is the cheapest way of permanently improving such soils.

THE CHEESE TRADE IN RELATION TO AGRICULTURE OF CANADA.

By J. W. ROBERTSON, DAIRY COMMISSIONER, OTTAWA.

All I hope to do to-night is to show how the cheese trade of Canada may illustrate to the farmers how they can make just as great a success of all operations as has been made of that one particular branch of it. The cheese trade of Canada is a large trade, but a very young trade. In 1871 there were in Canada just 353 cheese factories turning out $1,600,000 worth of cheese; in 1897 there were 2,759 cheese factories turning out $16,000,000 worth of cheese. That is a very fair growth for twenty-six years in a new country like Canada from 353 to 2,759, and from $1,600,000 to over $16,000,000. Now, is it possible that the production of the whole range of agriculture in the same period can make the same progress if the same principles were understood and applied as intelligently and successfully. I think it is possible, and it is worth working for on the part both of the Government and the farmers themselves.

The rapid progress of our cheese trade, and the excellent reputation it has brought to Canada, came mainly from the diffusion of exact knowledge. It is not "I guess it is about right," but "I know it is exactly right," that the cheesemakers and the patrons have made a success of their business that was followed up by the application according to the system. System will not do much, but a good system is better than no system with little knowledge. Then the system itself would not have made much headway but for the excellent organization on the part of those who were connected with this business.

This Association deserves a good deal of credit for the help it gave to the organization of this business in its earlier stages, and among the many men who have helped it in Canada, there are few names which deserve more credit than those of the men I find on your pages as Presidents and Directors of this Association in past years, who in promoting the welfare of the dairymen have been laying foundations for good living in the farm homes of the people in the country districts. And then the organization would have been hardly equally successful, but for the fact that every cheese factory was an illustration object lesson showing how the business could be duplicated in another district, and more cheese factories have been built from men going to look at a cheese factory than were built from reading books or listening to lectures. So I want to lay down these four heads for you. First, its stability—its growth—was largely due to exact knowledge, to the application of a system of organization on the part of those who conducted it, and to the fact that it was a series of illustration stations or object lessons for the education of the people who earn their living by the toil of their hands. Then this trade grew rapidly because of the very keen market conducted between the producer and the buyer, and the buyer and the seller. You know when a man fattens a steer in the neighborhood of Guelph and it goes to England, the English or Scotch eater smacks his lips and says that is capital Scotch beef. Your beef is often eaten over there as the best Scotch beef, but the man who fattens that steer in this country has not a chance of being instructed by the consumer whether that kind of steer was grown in the best way or whether it was of the best quality. There are too many middle men between the feeder and the eater in that case to get much instruction from the market. But in the early days of cheese-making every cheese buyer if he did not find his cheese up to the standard went for the maker right there, and so he was an educator, and I think we do not have quite enough in Canada of the educational influence of close market contact except in the case of dairy butter. If a woman has a private customer for her butter, and if it is not what it should be, there is a little dialogue between the dairy woman and the customer, and the result is the butter is all right the next week. When in England last summer with the Minister of Agriculture for the Dominion, we found that the British were complaining about the Canadian cheese not being so good as it used to be. I think it is a good deal better than it used to be, but if the English consumer thinks it is not so good and will not pay as good a price, then we cannot bring the money out of his pocket. There is no doubt our cheese is made better than it used to be, but the English people are making cheese so much better that they have raised their standard up higher, and our cheese is not up quite as near the top of the standard as it used to be, and that is where we are apt to be left if we do not look after the business.

We are fast taking the second place in the English market, and the reason is that there are so many more people working in factories, and it is not so fashionable to eat cheese as it used to be, and they are bound to have a real mild flavored cheese with a soft body, and the climate of England is suitable for making that class of cheese. The average temperature of the midland counties of England in July and August is just about 61 degrees, while our temperature varies anywhere between 50 and 95 degrees during these months, and that unreliable temperature is not the best to make mild cheese, and we will have to make the climate of Ontario, so far as it effects the curing of the cheese, precisely the same as the climate of England, or else we cannot hold that market. You say that it is impossible, but I do not mean the climate of Ontario out in your fields, but the climate in your curing-rooms. Some cheesemakers may think you ought to shade the sun to modify the climate of Ontario, instead of shading his windows to modify the climate of the small part of Ontario under his control. The climate can be modified very easily. First of all the walls should be constructed so that the warm air from the outside cannot get through. You should have double windows on every factory during all summer, because that is the time they are required.

Double windows to keep the heat out. Instead of putting in double windows in October to save fuel, put them on in June to save the heat. Have sub-earth ducts to let the cool air in, and an ice box to cool the temperature still further, and in that way you

can control the curing-room and control the cheese market of Great Britain for your cheese. If we do these things we will capture that market again, and I think we can keep it.

The Department proposes to have at least two illustration curing-rooms in Canada this year where half the cheese of the factory will be cured between 60 and 65 degrees, and the other half will have to be cured in the usual way, and then the product of the factory will be marked up, to find the commercial difference, and also to ascertain the difference of shrinkage in weight. As far as we know, in a small factory turning out 300 cheese a month, the saving in a well constructed curing room would be $450 a season, and the cost of the improvement would be $250 for all time. Every owner of a cheese factory should make the improvement this winter and spring so as to get the benefit of that much saving. It is just as important to have the curing-rooms kept warm in the autumn as to have them cool in the summer time.

I would like to offer a few observations on how these methods that have been applied to the cheese trade can be applied to the agriculture of Canada. Forty-five out of every hundred of our people make their living through farming, and a great deal depends on these farmers. They are the people who create the wealth of the country. Take the four great natural industries: Mining, $30,000,000 a year all told from the gold and silver; fisheries, $20,000,000 a year; lumbering, $80,000,000 a year; agriculture, $600,000,000 a year. In Canada alone we get $4.50 out of farms for every $1 from all other sources of original wealth. It is an important industry, and just every dollar extra that can be obtained in that way gives every man in Canada a chance to have rather a better living and more ease.

Let me give another illustration to show how humanity is bound up in the progress of the farmers. The gold products of the world annually for five years amount to $200,000,000. The whole output of silver annually for five years $210,000,000. Take all the gold that is taken from all the mines and all the silver and put them in one heap, and there is $410,000,000 as against $600,000,000 in Canada alone from her farms. We have not thought half enough about the importance of agriculture and the part it plays in giving us good clothes and good food and a chance for good education. We have very rich land in Canada, but the wealth does not come in proportion to the richness of the soil. Farming to-day requires a far more definite and exact knowledge than it did many years ago, and I do not think that the farmers have been keeping pace with other people in getting that knowledge for themselves. The wealth and prosperity of a country depend more on the knowledge of the people than the industry of the people. It requires knowledge, industry and skill and the old fashioned frugality. To have knowledge so as to be able to explain things seems to be the main object of schools now-a days, and I know lots of men who can explain the universe and cannot do a man's work. They can account for everything seen and unseen, but cannot earn bread and butter for one boy and one girl besides a wife. We need knowledge to enable us to bring things to a pass. It is written in the very nature of a boy that his education should begin with his hands and not with his tongue. A little boy tears things to pieces first, and the successful man in all lines are the men who use their hands. It is a common thing to hear people say "He is an educated man." We should see that the boys have manual training, and not a little technical education at the end of a High School course. Give them manual training for the development of a mental power. The boy does not spin a top by muscular power; it requires brain power to guide and throw, and that is far better brain work for him than sitting down and trying to add up a column of figures, and far more useful to him in after life when he gets in a tight place. We have far too many hours on books, and too few in play. We want knowledge of how to do things, and not how to explain things. I hope to see the time when no man can bear to face another who cannot do one trade well. You would think a man very incompetent if he could not put his own clothes on, but yet we hire men at $10 a month to do this for us, and a girl at $6 a month to do that, and the one thing we work at is how to get money. We want men in agriculture skillful in using tools who can do their work as well as a carpenter does his.

What a lot of silly notions are getting abroad through book knowledge. You will remember reading about the magnificent reformer that came into the world who put the whole record of man into groups B. C. and A. D. Did you ever think of anybody being so irreverent as to say that the man Christ had no brain power? Do you think it was merely an accident that made him a carpenter to do things, to have apprehensive clearness of brain structure that a whole man needed. We want more of this training of the brain through knowing a trade well. We need knowledge not merely of the soil, but knowledge of the scope of agriculture. So that a man will feel that he is filling a man's place in being a farmer. Lots of men skip from the farm to town because they say there is a career there for them. If a man has ever lived on a farm, and done farm work a while, and has not found $10 more poetry there than he will ever find in the shop or in any commercial capacity, he is a man born without any of these qualities of soul that gives a man power to see things beautiful in life.

We do not know much about some of our soils. By an analysis of lands in Canada in their virgin state it has been found that they contain about enough nitrogen to last for 150 years, and we have been farming for 100 years already, and if we have not put enough nitrogen back we have just 100 crops left, and we cannot even do that, because when the nitrogen gets low it will not last so well. We have phosphoric acid enough for 250 years, and potash enough for 750 years. Do not go buying potash manure, since nitrogen will run out in 150, and potash shall last us for 750 years.

Then we want a knowledge of the living things in the soil. I went down to Massachuetts and saw a specimen of that excellent soja bean. It makes a most excellent cattle feed. The roots were all covered with little nodules, and over in the neighboring State of Kentucky, the crops were all a failure, and they found that the roots were all smooth, and under a microscope these nodules showed a bacteria that were working on these roots and gathering nitrogen from the air. They took two bags of soil from this field in Massachusetts and pulverized it and put it on the land in Kentucky, and procured a big crop the next year. By doing so they carried live things from one soil to another. That is the whole meaning of agriculture. These little tiny forms of life break up the standard of the soil and make it suitable for plants. We cannot live long on the land if it was not for these tiny workers, working for us all the time, and when man understands what kind of work these little things are doing he can cultivate so as to give them a better chance. A farmer will say, "Why should it be a bad thing to plow clay land when it is wet?" Because the clay bakes and seals these things up, so that they cannot work. The mightiest gleaners we have to gather up wealth for the people are little tiny microbes, which can be discerned only with a powerful microscope. These are the first forms of live stock, and then we go higher and higher till we get the milch cow. The more man understands the nature of these lower forms of life the better he can manage his business.

Then again he should have more knowledge as to how much a man takes off his farm by selling certain things. A man can sell off his land more substance in one ton of hay than he will in eighty-seven tons of butter; so that if he wants to keep his farm intact, and not rob his soil, he had better sell butter and not hay. Then a man should have a better conception of the rotation of the crops, because all crops do not feed alike. Sometimes the little rootlets of one crop will take out of the soil what another crop would not take, and then some crops fit the land and make it better for other crops You may have rotation of crops, but if you have the rotation the wrong way it is like turning the hopper upside down and trying to pour your grain into it, with the result that you will spill more than you get. There is no better rotation in Canada than clover for either corn or wheat, and then anything you like for two years, and then clover for corn or wheat, putting in your turnips or carrots or other crops to clear the land.

Then we want system and knowledge to work so that the live stock will thrive. Do you know that around the whole globe the people who are the most masterful in the arts are the people who have the best horses, best cows and best sheep. Take an atlas when you go home and find out where they have the best of these things, and you will find that they are the best people. Even these little British Islands are the breeding grounds for

the live stock for the whole globe. South America goes there for the best cattle and horses, and the United States go there, and Canada goes there, and Asia goes there, and Australia goes there, because England has the best conditions of climate, soil and occupation to make these things of the highest order. And we in Ontario ought to make this the breeding ground for the live stock for this continent, and Guelph should be able to improve on account of good pasture and have the best of live stock; and then we could go to the States and help the people over there who have nothing but Kentucky blue grass and corn stalks to feed their cattle on. That means a continuation of these chances for doing common-place things well, not for making a special effort once a year or once a month, but a chance for doing the things of every day well, as an evidence of the ability of the farmer and the farm. Then we want organizations among the farmers to get their share of what they created. You have organized great organizations that go by the name of railway companies, then you have organized what are called steamship companies and boards of trade, chambers of commerce and, occasionally even organizations of farmers called cheese and butter manufacturers. We are a long distance from the English market, and the farmer should see if he could get more butter carried there safely and capture that market by putting cold storage on the cars or steamships. Last year these vessels carried over 200,000 packages of butter that was not spoiled one iota.

The export commerce of the country is increasing at a very rapid rate, and much of it through that natural gateway of traffic. The following comparative statement of the value of the exports of some of the farm products of Canada during the years 1896 and 1898, shows the growth in a short period, and indicates something of the great capacity for the expansion of its trade.

I will give you a few percentages of the increase in the value of some Canadian products exported in years 1896 and 1898:

Cattle	23	Flour	655
Cheese	25	Pease	39
Wheat	200	Butter	94
Oatmeal	52	Eggs	55
Pork, bacon and hams	82	Oats	1,010
Poultry and game	430		

These are proportions of increase between 1896 and 1898 of the exportation of these things from Canada, and if we keep on at that rate we will do well, and that is why good times are here. Good times follow the fortune of the farmers always.

My last point is that the cheese factories exhibit object lessons, where men can see them. We cultivate 30,000,000 of acres of land, and by the most careful computation we have in Canada over 300,000,000 acres of good land that will grow good crops, and yet we farm only 30,000,000. If we could get little illustrations for agriculture as we do for cheese factories I think you would see the same rapid expansion and increase. In the republic of France there are over 4,000 illustration stations for farmers to show how crops grow. I have never seen such crops, such splendid field cultivation and cleanliness of soil. In England the returns from the crops is 30 to 40 per cent. greater than it is in Canada, and in France the crop has doubled in the last thirty-five years, and why should not we have little illustration farms as well as cheese factories?

I think it is in contemplation by the Dominion Government to start some of these little illustration farms, and I hope good will come from them, particularly in increasing the crop returns. Out of these methods I have spoken of will come some of the best fruits that the people of Ontario and Canada can enjoy, because as agriculture is followed in this way it will be followed with a better understanding. It is a life where the people should have the highest measure of happiness, where the people should have a sense of security that they can earn a good living from year to year. A mechanic is always in fear lest he should lose his situation, and the professional man lest he should lose his practice, whereas the intelligent man of the farm never need fear of losing his living in that way. What a robust thing it is for a man to be able to say, "I do not care a rap for that." Strong, healthy people, with good, clear, strong heads, presided over by hearts instilled with good will continually—I hope that will be the result of a little study of the cheese trade in Canada.

METHODS OF SKIMMING CREAM AND MILK.

By Miss Laura Rose, Dairy School, Guelph.

I am sure I feel it an honor to be put on the programme, especially when I have heard that I am the only lady who has ever been on the platform of the Western Cheese and Butter Association. Then again I am pleased, because I like my name associated with the butter and cheese industry. You are dairymen, cheesemakers, buttermakers ; I am a dairymaid. (Applause). Last year I attended the association in London, and when I knew it was going to be in Guelph, and all our students at the College would have the privilege of attending, I felt it would be such an advantage to them. Then again, I thought it would be an advantage to you to have the pleasure of visiting us, and especially when everything was in full force at the Dairy School, when we had a goodly number of students, and you will see them all at work in their various departments.

I quite realize that methods of skimming milk is not a popular subject, especially to an audience composed somewhat of town people. The other day, a city lady said, "What is your subject?" I answered, "Methods of skimming milk." She said, "We do not need any method, for there is not much cream on the milk to take off." (Laughter.) So you can readily see from the standpoint of a townsperson that my subject will not be interesting.

I have a number of things on the table before me, and my only apology for bringing these utensils from the dairy is that I find, in teaching as well as in being taught, the more senses brought into play, the better and the more impressive the lesson. I had another object in view also. The townspeople do not know anything, and I thought when I started talking about the deep setting method and shallow pan method, they probably would not know what a deep pan was or a shallow one either. (Laughter).

Before we can successfully treat any substance, we have to know a little about what goes to make up that substance. So before talking about how to cream milk, I will talk just a few minutes about what milk is.

If I had a glass of milk in my hand you would know that it was good for you ; but if I should ask you to tell me the different constitutents and their percentages, and what they are for in the economy of the human body or in animal life, not fifty persons in the audience could tell me. It is something you should know, and if you knew more about it we would use vastly more milk on our tables. Milk is a yellowish, whitish liquid, largely composed of water, containing a number of constitutents held in solution and in suspension. The first and probably the most important of these is the butter fat, and in the creaming of the milk it is the one in which we are most concerned to-night. There is an average of three to six per cent. of fat in the milk. I have a small bottle here of the fat of milk. The fat in milk is in minute globules, so small that they average 1,300th part of an inch. That is if you had over 1,300 of them placed side by side they would just measure an inch ; I think I have read in some place, there are 200,000,000 of them in a thimblefull of milk, so you can have some idea how small they are.

The milk is largely colored from the globules in it, and they give it the yellowish tint, but it is not solely the fat that affects this. A lady said yesterday that feeding turnips made the milk richer. They add to the color, but do not affect the butter fat. We must not let the eye deceive us. It is a mistake to be guided solely by the eye.

Some cows' milk creams far more readily than others. If I had a small rubber ball and a large rubber ball, and could put them to the bottom of a pail of water, which would come more readily to the top? The large one. So it is with the fat globules. The Jersey and Guernsey cows have the largest fat globules of any breeds ; consequently their milk creams the fastest. The Ayrshire is just the opposite. The fat globules in their milk are the smallest, and this makes the Ayrshire cow essentially a cheeseman's cow, because the cheeseman does not want the cream to come to the top. The next

constituent in milk is casein, which to the cheeseman is just as valuable as the butter fat. This varies in different countries, from 2.6 to over 3 per cent. It is largely nitrogenous, and goes to form the muscle of our bodies. Skim milk is very valuable as a food. We think that when the cream is removed the milk is no good, whereas, as far as going to build up our bodies it is very nutritious, and it is a pity more skim milk is not given to children to drink.

There are $\frac{1}{10}$ of one per cent. of albumen in milk, which also is nitrogenous in its composition. Milk contains four per cent. of sugar. It is not as sweet as cane sugar, nor so subject to alcholic fermentation, and is used commercially in sweetening patent medicines and baby foods. There is a small percentage of mineral substance, which come originally out of the soil and is used in the economy of the body to build up bone, and goes to the enamel of the teeth, the hair, etc. About eighty-seven per cent. of milk is water. We have in milk a perfect food, the fat in the sugar going to produce fat in the body, energy and heat, the casein and albumen going to build up the flesh, and the mineral matter going to build the bone. All the milk less the fat is called milk serum, or in the common language, skim milk.

How are we going to set milk so as to get the cream? It is the cream we need to make butter. There are two main ways of setting milk. One is the natural or gravity system, and the other the mechanical or centrifugal system. We will first speak of the natural system, for as far back as time goes this method has been practised.

I have no use for the old fashioned skimmer, for skim as carefully as you can with it there is a great loss. I have done it conscientiously, so as to take the test, and I never got below $\frac{5}{10}$ of one per cent. of butter fat in the skim milk. We gathered samples from the farmers all around the country, and we found that averaged $\frac{8}{10}$ of one per cent. loss in skim milk. That was the average. Some were below that and some were over one per cent. Now, it seems a shame that after rearing cows, after feeding them, caring for them, milking them, setting the milk, then skimming, so as to lose one-fourth of the cream, you have been doing all this labor for nothing. It is a shame, because it is these little unknown leakages that are robbing the farmers. If we could be saving in small ways, we would find it far more profitable.

To properly skim shallow pans take a thin bladed knife and run it around the sides of the pan; then lift the pan to the cream crock, hold back the layer of cream with the knife, so as to let a little of the skim milk run over first to wet this outer edge of the pan. Then, with the knife glide the thick sheet of cream down. It will all run off into the pan, probably carrying with it considerable skim milk, but the cream is so thick it is just about what is required in churning. Now, if you have done this carefully, you will find that you can skim milk just as well and have no greater loss, than by setting it in the deep setting system. One disadvantage of setting in shallow pans is, you have such a surface of milk exposed to the air, and, unless you have pure air, you are going to have "off" flavors.

This summer, on my way to the coast, I stayed with a lady in Manitoba, and she said, "You do not like my butter?" and I said "No." (The first thing I am asked is, "What do you think of my butter?" and I usually reply, "I would rather not talk school.") She said, "What is the matter with it?" I told her she was keeping it in a badly ventilated cellar. She informed me her husband had built a lean-to to the house which covered over the hole that let air into the cellar. As a consequence everything smelt and tasted cellarish. Milk should stand in a room with a temperature of about 60 degrees for 24 hours in summer, better 36 hours, and 48 hours in winter, always skimming before it coagulates.

We also gathered samples of milk from people that were not using ice and were using deep tins, and we found their milk contained an average of nine-tenths of one per cent. of butter fat. They hardly would believe it, but that is what the Babcock tester proved. Have ice, and use plenty of it, to keep the milk below 45 degrees. It is poor economy to let the water get warm every day. Keep the ice there all the time; you will

not use as much ice, and will have better results. Always have the water come up as far as the milk in your tins. Let it stand over twelve hours in summer, and twenty-four hours in winter time, and set immediately, or as soon as you can after the milk is drawn from the cows.

I notice in looking over the last report of the Dairy Commissioner, that experiments have been made along this line. It was found by allowing the milk to stand for one hour before setting that it lost 11½ per cent. more butter fat than when it was set immediately. That is an important point. Investigators say there is fibrin in the milk, which when cooled forms a mesh through the milk, and prevents the fat globules from coming to the top. Shotgun cans, having no opening to let the milk out, should be skimmed with a funnel shapped dipper. First, loosen the cream from the sides of the can with a knife, rinse the dipper in milk or water, then lower it into the tin, allowing the cream to rise on all sides and overflow into it. If some cream sticks to the sides of the dipper, rinse it around well in your cream crock.

It is well to have cans with a slant bottom. It carries off any sediment that may accumulate in the bottom of the can, and also enables you to take off more of the skim milk. You should avoid having too much skim milk in your cream.

Another system which has come very much in vogue recently, is the mechanical or centrifugal system, by means of a cream separator. I have brought one with me, and I will explain it to you. (Miss Rose then described exhaustively the system of centrifugal skimming, exhibiting to the audience the different parts of a cream separator, and explaining them fully.)

Now what about the advantages of a cream separator? One is that you get more cream from your milk. Indeed you get nearly it all. In the deep setting system and the shallow pan system many minute fat globules have not enough force of character to get to the top, and like the prodigal of old, many of them are found feeding swine. (Laughter and applause.)

Another advantage is, we do not have to set the milk and then skim it, but get the cream immediately, in a small bulk to cool, and put away for churning, and we have the nice fresh skim milk for our stock. If I were starting a dairy, and some time when I get money enough it is my ambition to do so, I will have a cream separator, if I only have five cows. With a separator we can control the flavors of our cream, whereas if the milk stands around in shallow pans, or in deep setting cans, it is apt to become contaminated, so I would urge that if you have but eight cows, you invest in a cream separator.

I think there is no class of men more up-to-date, more anxious to get along than the creamery men. I have found that to be the case, and I am very glad to look at the audience and see so many fine looking young, energetic men. (Applause.) As I said in the opening of my address I am glad to be cast amongst you, and I hope there will be many more dairymaids who will be found on the platform of the Western Ontario Cheese and Butter Association In conclusion I extend to all an invitation to send your daughters or sisters to our College. The young men know the value of it, but the young women have yet to learn the advantages that are open to them in that respect. If you intend living on a farm you should make your work as easy, as interesting, and as profitable as you can. You can only do this by increasing your knowledge, and it is by increasing our knowledge that we can fill our pocketbooks. Farm work should not be the drudgery it is; and it would be no drudgery if we would put more skilled and less mechanical labor into our work (Applause.)

THE ECONOMIC VALUE OF GOOD ROADS.

By A. W. Campbell, C.E., Ontario Department of Agriculture, Toronto.

The science of economics has many branches, some of which may be more prominent than that which pertains to common roads, but none are more worthy of careful consideration. There was a period belonging to the history of the Roman Empire when the importance of roads was so fully recognized that the control of roads belonged to the Emperor. In later years, we find an Emperor of France, the first Napoleon, whose power overshadowed the whole of Europe, devoting his attention to the construction of roads. These roads of France and Rome, it is true, were railways and military routes as well. And if the importance of the common roads appears to have lessened in the mind of the people, it is only because attention has been diverted for a time to the construction of those magnificent lines of steel, which form a network over the continent from the Atlantic to the Pacific, and are an indelible record of the march of civilization and prosperity.

With respect to the actual monetary economy of roads, it is difficult to arrive at exact conclusions. In different localities, where the extent of the population, the average length of haul, the topography, products of the land, and other circumstances vary, the financial returns from road improvement must also differ. Moreover, statistics of a reliable nature on which to base conclusions are difficult if not impossible to gather. We can only reach approximate results which are, however, from their magnitude very convincing.

The financial returns to the farmers have been represented in a number of ways, one of the chief of which is in cheaper haulage. This may be in the shape of larger loads, the result of easier traction. For example, from experiments conducted for the French Government we learn that to move a wagon and load weighing together one ton of 2,240 pounds, at slow pace, the traction force on a low Telford road, surfaced with exceedingly hard stones, was forty-six pounds; on a level macadam roadway of small broken stones, sixty-five pounds; on a gravel road, 140 to 147 pounds; on a common earth road, 200 pounds. That is, nearly four times as much could be drawn on a perfect Telford road as on an earth road, provided the surface were level. If the load had to be lifted up an incline or lowered, this ratio would vary.

The economy of good roads may, from the above, be expressed in a reduced number of horses, practical illustrations of which we have in England and Scotland, where it is rare to see a farm load drawn by more than one horse, so perfect are the roads. If the number of farm horses could be reduced by one half, or making every allowance for farm requirements, say one quarter, the saving would be enormous. The number of farm horses employed in the United States, I do not know, but in the Province of Ontario, reports of the Bureau of Statistics show that in 1896 there were 434,384 working horses. This number does not include the unbroken horses or breeding mares, but represents the number actually used for work. Estimating the cost of horsekeeping at $60 a year, which is, I believe, a fair average, this would mean an annual saving of $6,515,760—no inconsiderable amount to a population of about two million.

Another basis of estimating the loss may be that of more rapid travel and haulage which would bring us, if we estimate time at a money value, to an enormous amount. In this connection I am reminded of a statement made by a Canadian member of Parliament who had used the road to a considerable extent, that he had lost one-fifth of his life by being compelled to travel over bad roads. This statement may be overdrawn, but it contains a fund of truth from which startling conclusions may be deduced.

The saving in haulage may be estimated with respect to the extended period in which it may be carried on. In this connection I would quote from my annual report of 1897, which included an estimate on this basis: "From the middle of October until the end of December, and from the first of March to the middle of May, a period of five months, by

far the greatest part of Ontario is mud, ruts and pitch-holes. This may vary somewhat in the more northerly and more southerly part of the Province, but it is the general rule of the average year. Of this period of five months, there are at least two months when the roads are practically impassable for loads. From the middle of November to the middle of December, from the middle of March until the middle of April, the agricultural trade of the country is practically cut off. For the remaining three months of the five, the roads are barely passable. To this may be added January and February for part of the Province, those southerly counties of Western Ontario where sleighing exists for two or three weeks at the most. If we include a winter month (and during winter there are many days when travel is shut off) there are six months of the year when travel and teaming are retarded by bad roads. Part of that time, at least two months as pointed out, country traffic is practically impossible. If during those two months fortune favor us with a few days when teaming can be done, there are plenty of days during the remainder of the year to make two months of impassable roads over the Province generally."

Statistics, as previously stated, show that in 1896 there were 434,384 working horses owned by the farmers of Ontario. Let us assume, and the assumption is a very moderate one indeed, that one-half of these horses, which would otherwise work, are prevented from doing so for two months or sixty days of the year, and that their teamsters are also left in idleness. This means that for 60 days 108,596 teams and teamsters are idle. The price generally paid is $3 a day for a team with a driver, and is a proper estimate of the value to the country.

The direct financial loss daily, therefore, is at least $325,788, and for sixty days, $19,547,280. At 3 per cent. this is the interest on capital of $651,576,000. The result of an estimate on this basis shows that Ontario could well afford to invest $8,000 on every mile of road in the Province. A large proportion of the road mileage included in this estimate is but very little travelled, and it is safe to say that one-third of this amount, or about $200,000,000, which is approximately the sum invested in the steam railways of the province, would convert Ontario into one of the best paved countries in the world.

Further estimates may be made with regard to the possibilities of longer hauls, as in France, where, because of the excellence of the roads, teamsters can compete with the railways in drawing goods several hundred miles. There is an additional saving in the wear of wagons, harness, and horseflesh, which, trifling in appearance, is, in the aggregate, no small amount. In this it has been estimated that the life of a horse would, by means of good roads, and consequently less overwork, be extended by a year, a very doubtful assumption.

A further division under which the financial returns to the farmer are to be considered, is the increased value of farm property. This increase in the value of farm property arises in the first instance from the greater profits accruing from farm property as the result of the saving in the cost of transporting farm produce. There are two ways of rendering any business more profitable. One is by increasing the price obtainable for the article produced ; the other is by decreasing the cost of production. Cheaper transportation by means of good roads, means in effect that the decreased cost of production and consequent increase of profit will guarantee a larger and readier investment in the farm.

The value of the farm is further enhanced by the increased opportunities that arise through good roads. The farmer is not impeded at any season of the year in the sale of his produce, and can in consequence reach the market when prices are highest. Good roads create a market for perishable produce—fruit, certain vegetables, milk—which, if it cannot be taken to the consumer in the town or city with the least possible delay, is unsaleable or can be disposed of only at a reduced price. Good roads bring farm lands ten, twenty or forty miles away, into available distance of a city market ; whereas, on the other hand, one mile of really bad road may render otherwise fertile land useless. Distance with respect to the farmer and the market is not measured by miles so much as by the time and labor it takes to transport his produce.

Among other branches of agriculture which demand good roads, dairying may be pointed to as a specific instance. Cheesemakers tell us, that in order to secure the best quality of cheese, the milk should be transferred to the factory as quickly as possible, with the least possible amount of jolting, and that the cheese should be manufactured in large quantities. The effect of changing the roads from bad to good in a dairying district is at once plain. The milk is carried over smooth road expeditiously from the dairy to the factory, with the least possible exposure to the sun, the least amount of churning in transit. The milk can be drawn from a larger area, the cheese made in larger quantities, factories fewer but larger, and manufacturing expenses thereby reduced, while a more uniform quality of cheese is produced. As an illustration of this, and one which is directly in point, I would refer to, the largest creamery in the world at St. Albans, Vt. St. Albans is a railway centre, and because of this the creamery was located there in order that the milk could be brought hundreds of miles by rail. By manufacturing in larger quantities they can afford to pay the cost of railway transportation and still realize a profit. Railways are merely smooth, hard roads with easy grades, making carriage cheap; and what railways have done for the creamery in St. Albans, good roads would do on a smaller scale for each creamery and cheese factory.

The value of farm land is further increased by the social privileges which good roads bring. One of the great drawbacks of country life is its isolation. Man is a social animal, and without the privilege of meeting his fellows he cannot attain his highest development. In spite of the healthful surroundings of farm life, its pure air, its abundance of the best and purest foods, statistics show that the insane asylums contain a greater proportion of farmers' wives than of any other class in the community. The cause assigned is the monotony to which they are subjected, the absence of all stimulant to thought and lively interest such as society creates. Why it should be the farmer's wife rather than the farmer is of course to be attributed to the lesser strength of constitution which the woman possesses, the nature of her work which is largely indoors, and further the fact that the man has, in marketing his produce, more frequent journeys to the neighbor or town. Good roads bring the farmer and his family nearer to the neighbor, to the town, to the school, the church and the public meeting.

The value of the farm is increased by increasing the attractions of country life, and encouraging a greater liking for it. Were country life what it can be made by means of easy access and communication, the tendency would be to draw the city folk to the country. In England, a country house is as necessary to every man of means as is his town house. The beautiful country-side of England is its greatest charm; it is beloved by the people and has done much to install that patriotic affection which every Englishman and Scotchman has for the motherland. Cuba is lost to Spain because she did not join the good roads movement.

To the townspeople good roads have a distinct economic value. Good roads are of vast benefit to commerce. Agriculture is the foundation of a large proportion of the trade of this country As agriculture prospers so will business prosper. Better home markets and better foreign markets for the farmer will bring more money into the country.

This means increased sale for the merchant and a greater demand on the manufacturer. Bad roads, besides the retarding influence on the country by lessening its ability to compete in foreign markets, cause produce to be marketed, not as the demand or prices require, but as the roads will permit The result is that the market is alternately glutted or starved; there is either unnatural excitement or depression. The stores are either deserted, or extra clerks have to be employed. Railways either cannot provide cars to move the contents of their granaries, or else their cars or crews are in idleness. Such fluctuations cannot but be hurtful. Trade is sensitive and easily deranged. When farmers can market their produce easily and regularly they have money with which to enable the merchant to turn over his stock and meet his obligations at the bank. The banks are thereby enabled to do business to greater advantage, and the whole machinery of commerce moves with less friction and less useless expenditure of energy. The stringency which so often takes place in the wet

season as the result of bad roads; the bad roads of Christmas time which so often bring disappointment to the merchant; the resulting failures which act and react on all classes of society are of well-known occurrences? The condition of the roads is a matter of frequent comment in commercial reports, and is one of the most potent factors influencing the barometer of trade.

Then, too, just as the turning of the townspeople from the city to the country is of benefit to the country, so it is a benefit to the town that its inhabitants should not cluster into the least possible space. By means of good roads, the business man can live in the country and each day go into the city or town to transact his affairs. He and his family can thereby inhale a purer moral atmosphere as well as a purer air, largely oxygen and ozone. He can surround himself with better sanitary conditions and live more nearly in accord with nature's laws.

While returns from good roads cannot be reduced to dollars and cents with any degree of accuracy, the cost of road construction and repair is a matter of mathematical solution. We can tell to within a few dollars what certain work on a road will cost, but it is not possible to tell exactly what the profit on the investment will be. From what has been previously outlined, the profits arising are, however, plainly very great to the country folk, the townspeople, and the State as a whole. Great Britain spends twenty-five million dollars a year on roads, France almost twenty millions. They are both countries of good roads, both countries of the finest business instinct. The object would appear to be to provide good roads at any price. The United States and Canada are each spending considerable sums on roads—on bad roads. Of course there must be some exception made in favor of a few States, notably Massachussetts, which is everywhere quoted as the foremost State in this most laudable enterprise.

There is a most important feature of roadmaking which must not be overlooked. The road must not merely be a good road with respect to actual construction, but it must be good in view of the service it will render and the cost. A road must be looked at in the same way as any other investment—with a view to the profits. It was in this respect that the Romans failed. Some of their roads are still in use, after nearly two thousand years of service. They were strong and durable, but built at such a prodigal expenditure as no nation could afford—a prodigality which became characteristic and eventually resulted in the decay of the Empire. If we are to receive the greatest benefit from good roads, we must carefully weigh the service they will render with the cost, keeping the balance as much in favor of the former as possible. In England, in France, in Germany, in some sections of Canada and the United States where the population is concentrated and largely urban, the limit of expenditure on the best of Telford and macadam road can be reached. The greater part of this continent, however, is sparsely settled, and there is as great, perhaps greater, need of farm roads adapted to simple requirements and circumstances and costing $1,000 or less a mile, as there is for roads costing $10,000 a mile. In the building of the cheaper class of roads, there is need of the greatest skill, for if the expenditure available is small, there is more need to apply it carefully.

Who should pay for county roads? Should the whole cost rest on the farmer whose property is reached by the roads? Or should the towns and cities pay a portion? Should road construction be performed at the expense of the local municipality or should the state participate?

The last mentioned alternative, state aid, is commonly adopted, and is the means whereby towns and cities, all classes of people, assist in paying the cost of road construction. Towns and cities are obviously benefitted by country roads. Without roads, towns and cities could not exist. Being benefitted, there is no reason why towns and cities should not assist in meeting the cost.

There are other reasons why state aid meets with approval. It appears to be the only means whereby roads of a better class can be built. They are the best of means in educating the public with regard to the value of roads. Good roads are their own best

advocates. Not only do they educate as to the value of roads, but they instruct and are object lessons in the best principle of road-making, and thereby assist in improving the roads which remain under the exclusive control of local councils.

The difficulty in arriving at exact conclusions with regard to the economic value of good roads, because of the absence of complete and reliable data, has been commented upon. There are additional impediments to our reaching a complete solution in the fact that the different benefits of good roads will combine, act and react upon one another so as to materially alter relative conditions. Ease of traction, longer hauls, more rapid travel, fewer horses, saving in wagons, harness and horse-flesh; increased rural population, less congestion in the cities, increased land values, greater profits on the farm; better business and social facilities—these will all unite toward the one end in enabling us to live well and more wisely. The people of the American continent have, to an abnormal extent, turned for their ideals to city life. The greatest ultimate benefit which good roads can confer is to bring us back from the towns which men have made, where brick walls, stone pavements, and odors of filth, have shut out remembrance of field, forest, stream, sky and nature's God—this is the most desirable of economic results.

AN INVITATION AND A KEY-NOTE.

By Hon. John Dryden, Ontario Minister of Agriculture, Toronto.

I have brought from Toronto the greetings of my colleagues, some of whom have been using their influence in supporting the organization which you now conduct. I want to congratulate you on the attendance which you have here at this convention, and the interest which appears to be manifested, and which has continued up to this time, and which, I have no doubt, will continue throughout the remainder of the meeting. I want to congratulate you also because you have managed to bring the convention to Guelph. You have come in the neighborhood of one of the strongest of our dairy schools. Possibly there may be some of you who have not seen it in operation, and I want to give you a special invitation to attend with the rest to-morrow and visit the Agricultural College. We expect you first to visit the dairy school, and when you are satisfied with what you have seen there I want you to inspect the other departments, and I am sure you will go away and say we are doing a good educational work in the dairy line, and I would like to suggest to you that we are doing an equally good work in all the other departments. (Hear, hear). After that, and when you have satisfied yourselves as to this, we want you to sit down in our dining-room and see how the boys live. I hope everybody in the room will understand that they have a hearty welcome, and that sufficient provision will be made for all.

I observed that all the speakers at the convention last week, and at this convention, have spoken of one thing which to them is an absolute necessity, and that is *superior production*. I want to emphasize that, as the key-note of this convention, and I want you to sound it abroad all through the country. Let it be proclaimed everywhere in the land that we must have the best goods so far as our cheese and butter are concerned, and indeed in all of our agricultural products we must maintain that superior production that we at the present time have. We cannot stand still. It is not too much for me to say that the Province of Ontario has been among the first to give this sort of education which my friend Prof. Robertson talked about to-night. Other people are copying it. In various countries they are copying these same methods now, and they will put just as much enthusiasm as we have into it, perhaps more. Therefore we cannot sit still, we must continue this education and this instruction, and we must keep ourselves to the front. I was horrified to find we had fallen back a notch. You cannot sell your product in the British market without a reputation. It takes a good while to get a reputation; it cannot be done in a day or a year, or in several years. Now we have secured a reputation,

but I point out to you that there is danger of our losing it unless we keep going forward. We cannot stand where we are. We must proceed forward, and our motto ought to be "Excelsior" all the time. I have great faith in the energy and enterprise and skill and in the pluck of Canadians. I believe we will keep to the front, but we must come together in this organization, and remember that we must keep to the front. We cannot do it without maintaining the place we are now in. That is why I emphasize this key-note, and plead with all to keep advancing along the lines set forth in the wise and practical counsels given at this convention.

A VISIT TO THE ONTARIO AGRICULTURAL COLLEGE.

On Thursday morning the members of the Association visited the Ontario Agricultural College and Farm in a body, and were shown through the various departments by Principal Mills and his staff. The chief attraction to the members of the Association, was the Dairy building, where they spent most of their time, and a great deal of useful information was acquired. Those who had not attended, and had not an opportunity before of visiting the Ontario Agricultural College, were agreeably surprised at the magnitude of the work that is being done at the College.

Before leaving for home they were entertained to a very excellent lunch, after which the President, Mr. Harold Eagle, thanked Principal Mills on behalf of the Association for the hospitalities extended.

IN MEMORIAM.

Moved by A. F. MacLaren, M.P., seconded by J. N. Paget: "That this Association having since its last convention lost by death one of its oldest members, Mr. John Robertson, of London, the members of this Cheese and Butter Association of Western Ontario, in convention assembled, desire to place on record the high esteem in which Mr. Robertson has always been held by them; and further, that, as a cheese and butter-maker, and as a cheese and butter instructor, and as a cheese and butter exporter, he had largely aided in bringing the butter and cheese trade of Canada into its present high position. He was a worthy man, and he has left behind him three worthy sons: Professor J. W. Robertson, of Ottawa, Robert, of Winnipeg, Manitoba, and John, of Glasgow."

TRANSPORTATION.

Moved by A. F. MacLaren, M.P., seconded by D. Derbyshire: "That the directors of this Association be requested to lay before the authorities of the railway companies of Canada the difficulties of their present method and charges of transportation of parties attending the annual conventions of the Cheese and Butter Association of Western Ontario, with a view to securing cheaper rates and more simple methods for the future; and that the directors of the Cheese and Butter Association of Eastern Ontario be requested to take similar action, either independently of, or in conjunction with, the directors of this Association."

CHEESE AND BUTTER-MAKERS' ASSOCIATION

OF

WESTERN ONTARIO.

The first Annual Convention of the Cheese and Butter-makers' Association of Western Ontario was held at McDonald's Music Hall, Listowel, Ont., on Wednesday and Thursday, 1st and 2nd of February, 1899.

PRESIDENT'S ADDRESS.

By T. B. Millar, London.

It gives me much pleasure to meet you at this, the first annual convention of the Cheese and Butter-makers' Association of Western Ontario. As many of you are aware Listowel is one of the largest cheese markets in the Province, and is situated in one of the finest dairying districts of the west.

The history of the Association is a brief one, as it is scarcely a year since it was organized. On January 20th, 1898, a meeting of makers was held in London, when a provisional board was elected, which arranged to hold a meeting at Woodstock on February 23rd and 24th following. At this meeting the organization was completed, and the present officers elected. During the short time that we have been in office we have endeavored to advance the interests of dairying, especially those of the makers. How far we have succeeded we leave it with the members to say.

The vast majority of the makers throughout our district have shown their approval of the Association by giving it their hearty co operation and support, the oldest and most prominent dairymen being members, and taking part in it.

One thing that we have done was in getting out forms of agreements to be used between factorymen and makers, and the hearty manner with which these were received by the makers and many factorymen shows the advisability of such action. If this agreement is carried out in the same spirit in which it was issued, it will be the means of doing more to improve the quality of our dairy products than any one thing that has been attempted in many years. What the makers should do is to work together for their mutual benefit, always with an eye to the improving of the quality of the goods. There is much to be gained along these lines, and it will never be successfully accomplished while standing apart.

In spite of the many drawbacks and discouragements of the past season, the cheese and butter makers have no reason to fear the future. We cannot raise the price of cheese and butter, but we can improve the quality and thus increase the demand. There is no reason why we cannot make the finest cheese and butter in the world; but to do this we must be men and women who are desirous of attaining the highest possible standard, and satisfied with nothing less. We must have the milk delivered in first-class condition, and

must have better buildings for making and curing, especially the curing of cheese. The curing-rooms must be so constructed that we can control the temperature in them, for without these means we cannot, even with the best of skill in the making, reach the highest point of perfection.

We had hoped to grant certificates to members who had shown themselves to be successful makers, but as yet we have not had time to deal with this matter, though I am looking forward to the time when such will be the case.

As the constitution was prepared hurriedly it may be necessary that some amendments be made. If so, it would be in order, some time during the convention, to do so. The membership is all that could be desired for the first year, but we look for at least five hundred this year.

The dairy exhibit is a new feature at meetings of this kind in Ontario, and being somewhat late of announcement, we do not look for a large exhibit; but I trust it will be a good object lesson to us all. The cheese scoring the highest number of points will be cut up and distributed to the members present for discussion, the judges being in attendance to answer any questions that may arise regarding the score. I have secured, also, a a couple of cheese that are not entered for competition, but will be open for inspection and criticism.

By these annual conventions we hope to arouse greater interest, to gather and disseminate the latest dairy knowledge and best methods, and to excite its members on to further and more skillful effort. The sessions will be made as practical as possible, and every member here is invited and expected to take part in the discussions following each subject, thus making them more useful and more instructive.

DIRECTORS' REPORT.

Mr. G. N. Barr read the following report on behalf of the Directors:

Your Directors for the year 1898 beg leave to submit the following report. The Directors organized themselves as follows:

Secretary-Treasurer: W. W. Brown.

Executive Committee: The President, Messrs. Barr, Brown, Goodhand and Brodie.

The Directors held five meetings, and the Executive Committee two meetings. At a meeting of the Directors held on March 10th two inspectors were appointed, viz., T. B. Millar and Jas. Morrison. The object of the Directors in making these appointments was, that in cases of disputes arising between members of the Association and factorymen as to quality of goods, these inspectors could be called upon to adjust the dispute. There was printed and sent to each maker in Western Ontario a prospectus setting forth the objects of the Association, and giving an outline of the work the Directors purposed carrying on.

An agreement between the Cheese and Butter-makers' Association of Western Ontario and the makers was drawn up in legal form, and Mr. Geo. Goodhand appointed to visit the makers to get their signatures to the agreement, and it is gratifying to report that 215 makers have signed this agreement.

There was also printed and sent to each member an agreement between factorymen and makers, to be used in entering into contracts for this year.

It was, after careful deliberation on the part of your Directors, decided to have an exhibit of cheese and butter at this convention. They decided to do so, believing such an exhibit would be a good object lesson to makers, and would create a further interest in the Association. The sum of $150 is offered for prizes.

The cheese buyers of the west have contributed the sum of $10 each towards the prizes, also the "Thames Dairy Co." have contributed $10 towards the funds, and we take this opportunity to thank these several parties for their kindness and liberality.

Circulars have been printed and sent to each member giving the several prizes offered in each class, together with entry forms. The programme of the convention has been published in pamphlet form, and copies sent to each member. We would urge every cheese and butter-maker in Western Ontario to become a member of this Association, believing it will be a benefit to them and every one engaged in the dairy industry. All of which is respectfully submitted.

FINANCIAL STATEMENT.

Receipts.	
Cash on hand from last year	$ 5 50
Membership fees	148 00
Advertisements in prospectus	20 70
Advertisements in convention programme	60 50
Entry fees	42 50
Total	$277 20

Expenditures.	
Postage and stationery	$ 53 11
Printing	33 95
Directors' fees and travelling expenses	74 60
G. E. Goodhand, for salary and expenses.	46 00
Telephone, telegraph and freight expenses	4 01
Law charges	9 00
Badges and Secretary's salary	57 75
Total	$278 42
	277 20
Leaving us in debt	$ 0 22

THE CARE OF MILK.

By W. A. Bothwell, Hickson.

In the advanced stage of dairying to which we in Ontario have arrived, the care of the milk to be supplied to the cheese factories possibly stands first in importance in the matter of producing a fine product. For certainly without pure, untainted milk to begin with we cannot have a fine quality of cheese or butter. In years gone by when dairymen kept a fewer number of cows, and these during the dairy season were fed on nothing but the native grasses, a much purer quality of milk was procured than is now delivered at our factories. Now, when the herds are larger, and when the milk flow is increased by various foods, some of which produce objectionable flavors, the dairymen must exercise greater care with the milk product. This Canada of ours is a dairying country. To make the most of our dairy we must produce the best possible results in the quality of the article manufactured.

We have to engage in competition with other countries, and there will be little money in the industry for us if we are compelled to take second place. The Government is providing dairy schools that the makers may not lack in efficiency. They have provided cold storage shipment that the product may not suffer in transportation, so that it may reach the market in the best possible condition. So now it rests with the dairymen to give the industry the proper start. Surely a business that brings annually to the pockets of the farmers of the country nearly $17,000,000 is worthy their earnest consideration.

Immediately after the milk is drawn it should be well stirred and aired until all the animal heat is gone out of it. It should then be put in a sheltered, airy place free from all bad odors. This is within reach of all, as no costly appliances are required—nothing but care.

A FEW "DON'TS." Don't keep the milk in the cellar. This often gives musty, stale flavor. Don't keep it in large quantities over night. Don't put it in cold water until all the animal heat has been driven off, and not then unless in extremely warm weather, or when to be kept over Sunday. Not only do many kinds of food give the milk objectionable flavors, but impure water is a common source of this evil. Too much stress cannot be given to the matter of providing pure drinking water for the herd. Cows will not drink bad water if good is at hand, and it should be considered little less than a crime to allow them to drink from stagnant pools or drains, when it is possible to obtain better.

Now these bad flavors lessen the value of our product from one to two cents per pound, and in the majority of cases the blame rests entirely with the patron. He has entire control of the milk before it reaches the maker. This is one of the points that every maker must look after, and see to it that the patrons do properly care for the milk. Do not hesitate to refuse it if it be not in good condition. You cannot afford to run the risk of using inferior milk. The best is none too good. A few cans of bad flavored milk will spoil a whole day's output, and means a serious loss not only to the factory but to the maker. It costs as much to haul poor milk as good. It costs the same to manufacture, so by all means let us have it good. If we find a patron who is not caring for his milk as he should, then in justice to the factory, and in justice to ourselves, we must see him and endeavor to find out where the trouble lies, and by all fair means seek to have it removed. If we are unable to go and see him we should write him or send word in some way. But be careful here, as this is a touchy point. All will be right if approached in the proper way, but liable to give us trouble if we do not proceed judiciously. We must be at one with our patrons. Let there be unity and harmony is an oft-repeated saying, but in no case is it more applicable than in this one.

I believe there is a bright future ahead for Canada in the dairy industry. Here is an industry that will bring her more wealth than even the Klondyke, if those engaged in it exercise the proper energy and care. There is a glowing future ahead for every honest, energetic, up-to-date young cheesemaker.

Mr. A. T. BELL: I would like to ask Mr. Bothwell which plan he thinks best for farmers to adopt in keeping the milk over night, whether to use the aerators they can purchase, or what plan he finds most successful.

Mr. BOTHWELL: I find a few of our patrons have been putting it in water; they do not use aerators. Some of them put a couple of posts up and nail a scantling on them, and then put a roof over it and put hooks in the scantling and hang the milk in pails to these hooks, and by bailing it a little they secure good results. I do not think many of our people use aerators. The plan I have given you of hanging the milk in pails keeps the tough cream from rising to the top.

Mr. BELL: I always advocated that plan. Keep the milk in pails and do away with agitators. I prefer a clean, sweet tin pail; hang it up, give it a few stirs and I will warrant it will keep till morning, if everything is clean.

Mr. BOTHWELL: I would prefer the wire strainer to the cloth strainer. A great many use a strainer that will fit right over the can, and pour the milk right into it. A cloth strainer is hard to keep clean. I think a great deal of milk is spoiled by keeping it in large quantities and also by using bad water. If you put a large quantity of milk into a can, it never gets thoroughly aired. I think it would be practical where a man had sixty cows to keep it in pails, and I think it would be better to do that than to have the milk returned.

The PRESIDENT: I believe there is a great deal of milk spoiled by putting a large quantity of milk in one can, and then sitting the can in a tank of cold water without stirring the milk. I know that is practised in some sections where people have a lot of cows, they put the milk in the water and chill it. That has the effect of keeping the milk sweet; but if there is a bad flavor in the milk, the flavor is still there; they have not aired it to get rid of it. The cream gets sealed over the top and holds it there, and after the milk is heated these bad germs begin to multiply, and then we have bad cheese. My idea

is to keep the milk in as small quantities as possible and cool it by airing. If you cannot get it cool enough by airing, then I would use water. I areate by bailing it—dipping it up and pouring it. Get it thoroughly well aired before you put it into cold water.

A MEMBER: Have you had any experience with a machine for forcing air through the milk?

Mr. BOTHWELL: There was an agent around our way with something like that, but I don't think there are any of them in use, at least, not to my knowledge. We have one patron who keeps his milk well. He keeps it in pails and pours from one pail to another and after he does that two or three times it keeps well. We have had considerable trouble on account of milk being kept over Sunday in cellars where it gets an old, stale flavor, although the milk is perfectly sweet. I would never put milk in water unless it was to keep a long time. I would never do so for the purpose of keeping it over night, unless the weather was extremely hot. In order to keep it over Sunday it is almost a necessity to put it into water, but I would areate it well first. I have found in some factories, where the patrons have large herds, they have a big water-trough and a wind-mill, and they cool the milk, and then it is a terrible job to do anything with it at the factory.

A. F. MACLAREN, M.P.: I heard of a case the other day, where a man stirred and aired his milk for some time, and then used to put a two-gallon jug of water into the milk, but had a cork in the jug. Have you ever heard of a case of that kind, and if so how did it work?

The PRESIDENT: I have heard of them using shot-gun cans; filling them with ice and putting them down in the milk, that is all right after the milk has been thoroughly aired; but if you cool the milk down too low you are apt to develop bitter flavors and that is something we do not want. I think that if the milk is cooled to 60° it will keep in almost any kind of weather. The fermentation is checked at 67° to 68°. I would prefer cooling it with air, and then if I could not get it as low as I wanted it I would either put a can of water into the milk or sit the can of milk into a tub. Of course the quicker way is to take a shot-gun can or a tub, but be sure to put in the cork.

A MEMBER: How would you advise sending milk to the factory, the morning's and evening's milk mixed, or kept separate?

The PRESIDENT: I would prefer it kept separate.

Mr. MALCOLM: We set our milk in cans in cool water, but I have heard it gives it a smothered flavor, and I think there is something in that. Of course we make up our own cheese, and I know it does not make first-class cheese if you keep the milk too cool.

Mr. A. T. BELL: This is a very important subject. In my experience I have found that they were stirring the milk with a dipper that had a hole in the handle or a little dent, perhaps only as large as a pin point and milk accumulating in that hole causes it to give the milk a cellar flavor. Upon investigating we found it came just from using the dipper with the small hole in it, and I have had several cases every year of that kind. In other cases I have found them using the strainers for dish-cloths, and for that reason I have tried to get the cloth strainers weeded out. It is a very filthy practice to use the strainer for a dish-cloth. I am an advocate of the wire strainer.

The PRESIDENT: I am satisfied that if we are going to reach the highest point of perfection we must get the milk in better condition. No matter how much skill you put in the making, if you have not good milk to start with you will never make the very finest butter or cheese. The producers of the milk have a good deal to do with the product, and if they would study more the best methods of caring for their milk, and deliver it in the very finest condition, then, if the cheesemaker used his best judgment in manufacturing, we would make quite an advance in the quality of our goods.

Mr. GOODHAND: I am taking milk at Milverton, and we generally get good milk, and the men who send us the best milk are those who adopt the plan of hanging their pails up. They set two posts in the ground, and put a scantling across the top, on which they have hooks, and they hang the pails on these hooks, and go two or three times to

them pouring the milk from one pail to another. They have a cover on the top and they strain the milk into the can in the morning. I have tried hard to get all my patrons to adopt that system. The men who cooled their milk with water were the ones who got the milk sent home if any did.

A MEMBER: Was the milk not strained into the pails in the first place?

Mr. GOODHAND: Not at night. Some of them did not strain it, they just left it as they milked it in the pail, and they strained it in the morning, and they sent me as good milk as I ever saw go into a factory.

Mr. PRICE: Do you not think the tendency would be that it would not get strained at all? I have noticed patrons who were using separators leave the milk standing around in pails before it was separated. I think it would be much better to strain the milk first.

The PRESIDENT: I would say, by all means strain the milk whether you leave it in pails or not; because there is always a little dirt will get in during the milking, and the sooner you get that strained out the better. There is just a question in my mind as to whether this plan of hanging milk in pails is feasible or not, but where it can be carried out I have no doubt it is a good plan. Some of the best dairymen have been adopting it with good results The difficulty is to got some plan that everybody can adopt. During the season when cheese is a low price we find it a hard matter to get patrons to take care of the milk. I have heard men say that if they had to strain the milk and air it they would keep it home and feed it to the hogs.

Mr. GRAY: I was pleased to hear Mr. Bell mention the dipper question. This season there was a patron who got his milk home one morning, and he told me that he could not understand why it was he got it home. He said he had taken extra good care with it, and could not account for its being bad. But on examining the dipper he found little holes in the handle of it where the milk had been accumulating for some time, and that gave the milk a bad flavor. Some of our patrons use aerators. I know one who has a large tin dish with holes punched in the bottom, and he dips this down in the milk and draws it up through the milk and lets the milk pour through the holes. I do not believe in putting the milk in cold water, except where it is kept from Saturday till Monday. Then it might be necessary to keep it in that way; but it never should be done before the milk is thoroughly aired.

Mr. OLELAND: You will notice that a great many of the patrons—in fact most of them—consider that the whole responsibility, or most of it, rests on the cheesemaker. In my opinion the cheesemaker of this country is fairly well posted in the making of cheese, and if the patrons would do their duty thoroughly and well there would be very little danger of having bad cheese. (Loud applause.) I think the patrons of the factory can make that factory just exactly what they want it to be, by doing their own duty thoroughly and well. There is no man who can make a clean thing out of an unclean article. The success of the factory depends on the way they get the raw material at the factory. It is not so much for the want of knowing how to do things as it is for the want of doing as well as we know how. I do not believe we suffer so much from the want of knowledge, as from the lack of doing what we know. If we would only do this there would be little room for complaint. There cannot be too much care taken of the milk before it gets to the factory. The character of the cheese is fixed on the farm, and not at the factory. Many times milk comes to the factories when the maker is not able to detect the slightest thing wrong with it. The flavor will not show itself until it is heated up, and then it takes the factorymen a long time before they can find out who is sending that tainted milk. If every patron would do his duty there would be no danger. In the first place they must take care of the cow and feed it proper food, and then they must take care of the milk. Some people leave the milk standing in the stable in the pails. This should never be done because milk will take taints very quickly. One patron sending poor milk will destroy the cheese of a whole factory; and then they come on the cheesemaker, when as a matter of fact he is not at all responsible for the trouble. I would advise patrons to do their level best to send the milk to the factory in the best

possible condition. Everybody knows that this business is run at high pressure, and that we have a reputation to maintain—that we have the best reputation in the old country. There is no foreign cheese going into Great Britain that is better than our own western cheese. I think I heard some person say it is not necessary to cool milk. I think it is absolutely necessary. If the milk you keep over from Saturday till Monday is not properly cooled it will not come to the factory in proper condition. Cleanliness is next to godliness, and I think it is a very necessary thing in the cheese and butter business. Some factory owners hire poor cheesemakers because they are the cheapest; I think that is a great mistake. If a man puts in a low tender that is the basis on which you should estimate his work. Some owners hire such a man to save a few dollars on his salary, while they are throwing away hundreds of dollars on the price of the cheese. I think we have cheesemakers who are well enough posted to produce a good article if they got the raw material in the right condition. When we get our cheese across the water we have to contend against the whole world, and the only thing that will keep us to the front is quality; and we should sacrifice everything for quality. It is a remarkable thing how some farmers will still persist in feeding turnips when they know it does harm. If they would feed mangels or carrots instead of turnips they would improve the quality of their milk. They can raise more mangels than turnips, and I would advise them to do so, and I hope everybody will do their duty from this day out and keep us on the top.

Mr. Muir: If you want to use a dipper you can use one with a galvanized iron handle that is open, and there would be no danger of holes getting into it, in which anything can accumulate. A convenient way of treating milk is to have two pails, leave one pail standing while you are milking into the other, and then pour it from one to the other. This aerates the milk and leaves it in good condition.

Mr. Bell: Some of our patrons take a pail and get it punched all full of holes in the bottom, then letting it drop down into the milk lift it up again allowing the milk to pour through the holes. That plan has been found very satisfactory.

A Member: I had a little experience last summer. Having sent a patron's milk home several times, I set a night to go and see him, but something turned up and three or four nights passed before I got there. From what I heard from the drawer they were doing everything in their power to take care of the milk, and I believe ninety-nine patrons out of every hundred are willing to take care of the milk in the best possible manner. But I believe some of them do not know how; they do not seem to give the matter a thought. Now, this patron, when I got to his place, was not at home, but his wife showed me where the can was, and I found all they were doing was to milk the milk and put it in the can and set it on the stand. I arrived there about half-past eight, and the milk was standing there at about ninety-four degrees. I asked if she had a tub, and she got one and some water, and I spent about fifteen minutes aereating it. I then set the milk up on the stand and said, "I will see how this is in the morning." She said if that was all that was wanted she would see that it was attended to. The next morning the milk arrived in first class condition, and I sent word back to that effect, and from that day to the end of the season I never had any trouble. They were willing to take care of it, but did not seem to know how to go about it

Prof. Dean: Through experiments we carried out last summer we found it was necessary to cool at seventy degrees.

Mr. Chalmers: What do you consider the best way of reaching patrons in the way of instructing them in the care of milk? If you send out circulars they never take the trouble to read them, and it is hard to visit them personally.

The President: It is a very hard matter to reach the patrons, because, at the annual meeting there is other business, and it is the wrong time of the year. People are not then producing milk for factory purposes, and if you give them instruction at that time they have forgotten all about it by the first of April or May, I believe the proper method is to see these patrons who are producing bad milk, and, as Mr. Agur says, show them how you would take care of it. In many cases it is a hardship to do so because the work in the factory keeps the maker busy from morning till night.

Prof. DEAN : I think the only way to reach this root of the whole difficulty is to employ men whose business it is to go around to the farmers. Let them represent a half dozen factories or more. Last week I visited the New York State Dairy Convention and Mr. Cook there proposed to employ an inspector who should go around to his factories : he owns about fifteen or twenty. To some extent this is being done in eastern Ontario, and I think we shall have to come to that. Employ a nice, kind, good-looking man with plenty of tact, who will make it his business to visit every patron, show them how to take care of the milk, and in that way we would get at this trouble which causes so much difficulty. I think that is the only way. Get right to the farmers—circulars and meetings do not reach the class of people you want to reach—and the cheese and buttermakers have not time to do that, so a man must be employed for the purpose. (Applause.)

The PRESIDENT : I intend to follow out the line Prof. Dean has laid down. I have three factories under my management, and I am going to do the best I can. I have good men employed to make the cheese and butter, and I intend to devote the most of my time among the patrons and give them all the help I can along the lines of the production and care of milk.

Mr. A. T. BELL : I heartily endorse what the President and Prof. Dean have said. I have found it the best plan to go and see the patrons. We issue circulars every year, but I find there is nothing like a personal visit. The cheesemaker has no time to do the work, and I agree with the statement that a man will have to be employed for the purpose.

SUMMER BUTTER MAKING.

By FRED. DEAN, ST. MARYS.

A butter-maker cannot have any fixed rules for manufacturing first-class butter. Each day brings him new experiences and trials, which can only be overcome by using that which is most essential, yet too often lacking in a butter-maker—common sense. We are so often irritated by the little things and mistakes in our business, that if a little of the aforesaid substance had been used we would have fewer troubles. The main object is securing a first-class article of butter in the summer-time, and the key-note is "cleanliness," from the food and water given to the cow until the butter is placed in the hands of the consumer. So much has been said and written on this point, that you really would think there was nothing more to say, but it is only by nagging away from time to time that perhaps at last our object will be accomplished, and that is by educating the farmer to co-operate in this industry, feeding his cow such food that will not taint the milk, and keep her healthy, letting her have abundance of good pure water, and not drink out of any mud-hole in some corner of the pasture field, or along the side of the road. We must show him how he can best aerate his milk, by running it over an aerator or using a solid handled dipper to stir it thoroughly, letting the animal odors off, and have it purified by coming in contact with the atmosphere out doors ; then cooling it down so that fermentation will not take place, taking into consideration that it has been strained and put into vessels that have been thoroughly washed, scalded, and steamed, If you have educated the farmer up to this point your butter is half made, for it is this fighting filth and carelessness on the part of the patron that keeps summer-makers continually in hot water.

The best of butter-makers fail now and again to make an even quality of butter, even when they have educated the patron, and receive a first-class lot of milk. This, no doubt, is owing to the different changes and conditions of the milk and weather, and cannot be placed to the discredit of either ; but we are in an age now when nothing seems too great for man or machinery to overcome, and to overcome this point we must pasteurize our milk or cream every day to get this even quality, and be able to compete with foreign

countries in obtaining a high price in the Old Country market. This is what we are making preparations for during the coming season. At each of the stations a pasteurizer will be placed to pasteurize the cream only, the cream drawer will then bring it to the central station, where it will be run over the cooler to a temperature of sixty degrees. A skim-milk starter is used, being made of a half can of good, pure skim-milk. Pasteurize all this by heating to one hundred and sixty degrees, and let it stand for twenty minutes. Then add as much good spring water as milk, which cools it down to ninety-eight; stir it well and add one dipper full of the old starter, changing once in two weeks by letting the skim-milk stand two days without adding the ferment. Use buttermilk that day, or if your buttermilk is of an even flavor and good, use it right along The starter is put in the vat before the cream, so that fermentation takes place immediately. When about twenty-eight or thirty per cent. of acid is shown by the acid test, cool down quickly as possible to forty-eight or fifty degrees, stirring it every half hour or so with a common hay rake, which has given me the best of satisfaction. After the cream is all pumped up and strained the pipes are all thoroughly flushed with luke-warm water, then steamed, followed with boiling water pumped through them each day. The cream should be kept at churning temperature from ten to twelve hours before churning, and be well stirred before putting it into the churn, and should not show any more than sixty per cent. of acid or less than fifty per cent. If too much acid has developed, the casein coagulates firmly during the churning and breaks up into small white specks, which are incorporated in the butter, giving it a bad appearance, and when a few weeks old a very disagreeable flavor. When the cream has not sufficient acid, it lacks in flavor, will not keep so long, and a larger percentage of fat will be found in the buttermilk. When the churn has been scalded and cooled, strain the cream through a zinc strainer, filling the churn one-half full or a little over, revolving from fifty-five to sixty revolutions per minute, taking from thirty-five to forty-five minutes to churn at a temperature of fifty degrees. When the cream begins to swish in the churn it is a sign that it has broken, showing minute specks of butter. Stop the churn and add a pail of water the temperature of cream, with a handful of salt, which gives the butter a better chance to separate from the buttermilk and hardens the globules. Let the churn revolve again until the butter shows about the size of wheat grains, when the buttermilk is drawn off, and after draining for five minutes let the water at 48° run through until it is clear; close the tap and fill the churn two-thirds full, revolve for half minute, and draw off water, rinsing down with same. After the butter has drained for fifteen or twenty minutes it is shovelled into eighty-pound tubs and weighed, putting the worker into two tubs, then sprinkling on five pounds of salt, and again adding two more tubs, finishing salting at one-half to five-eighths of an ounce to one pound of butter. We use the National worker with an indicator, letting it work for about four minutes; then drain five minutes, and finish working it in from six to seven minutes, according to the texture, which is shown by breaking over the roller reluctantly, and when pressed by the finger gives a velvety and waxy feel. The butter is only worked once, and during the summer we never had a mottle or a greasy package. When ready for packing, the butter is put on a long table with scales on one end, and another smaller table used for boxes, which are twelve and a quarter inches square, made of spruce, paraffined on the inside and lined with very heavy parchment paper, fifty-two inches long and twelve and a half inches wide, two strips in each box, soaked in strong brine from twelve to fifteen hours before using. Butter that is to be packed for future consumption should be a great deal drier than that intended for immediate use. It should also be packed solidly, so that when turned out of the box it will not show any crevices for brine to lodge, giving it an unsightly appearance. When the box is filled put it on the scales and scrape off butter with a stick of wood twenty inches long having four inches grooved off each end with a movable strip fastened with a screw, letting it raise or lower according to the amount you wish to take off, allowing one and one-half pounds for shrinkage. A weak brine is now poured over the butter to prevent moulding, and the butter from sticking to the paper, fold the four ends over and put on a heavy paste of water and salt about one-quarter of an inch thick, fastening on the lid with screw-nails. Put the butter in a room the first day with a temperature

between forty-five and fifty degrees, so that it will have a chance to cool gradually before putting it into the refrigerating room, which should be at a temperature of thirty to thirty-five, and if kept for any length of time, below thirty. After the day's make is over wash all woodenware in boiling water, steam thoroughly, and give a light sprinkling of salt over everything. Scrub the floors, which should be of cement, with boiling water, and then pour a dozen or so pails of the same down each waste-pipe and gutter, accompanied every two or three weeks with a solution of copperas.

Mr. BRILL: Does Mr. Dean advocate just one working of butter?

Mr. DEAN: I have never worked it twice in my life in summer time; I have done it sometimes in the winter.

Mr. BRILL: You spoke of the farmer being to blame in not giving you proper milk. I find up our way the butter-makers are as much to blame as the farmers. There is pretty strong opposition in our neighborhood. We have three waggons on one road, and if one butter-maker will not take it the farmers say, "Oh, well, the other one will."

Mr. DEAN: We have skimming stations, and any milk that is not first-class we refuse altogether. We have started out with that rule, and we intend to keep on in that way, and I think that is the reason we have had so much success.

Mr. BRILL: That would be all right if all the butter factories were the same way.

Mr. MARSHALL: I would like to ask Mr. Dean what benefit he finds in putting a soft paste over the top of the boxes. We have been exporting butter for the last year and have never done so, and if there is any benefit to be derived in putting this soft paste over the top we would like to know it.

Mr. DEAN: Mr Hunter, our buyer in Manchester, was over twice last summer, and he told me he had packages of all kinds, and he never knew a package of ours to be moulded. He says the butter comes over in good condition, and he finds the soft paste on the top keeps the butter in better condition and prevents moulding. He likes the plan and we have always done it, summer and winter.

Mr. BRILL: Last summer was the first time we commenced to use boxes at Teeswater, and I sent a dozen with brine and one dozen without brine, and we received word back to continue brining. It prevents the butter from moulding, and the paper is not dried up the same.

Mr. ARCHIE SMITH: I would like to ask Mr. Dean what temperature he ripens his cream at, and how long he takes to do it?

Mr. DEAN: In summer time we separate at whatever temperature it comes in at. After April we never put a bit of heat to our milk. We separate and take samples, and we never find that skimming over .05 or .06. We find we have better texture the lower the cream is ripened at. We ripen at about sixty and sixty-five degrees. Of course in the morning when we start at the central station we put our cream into the vats along with the starter; and in the afternoon when the cream comes to the station we start to cool down immediately, and we find we always have enough acid the next morning.

Mr. SMITH: You ripen at sixty or sixty-five degrees, and still have it ripened for ten or twelve hours before churning?

Mr. DEAN: Yes, the cream comes in about three o'clock, and we cool it down with ice so that it will have ten or twelve hours to cool before churning.

Mr. PRICE: With regard to these questions that have been asked, it is pretty hard to discuss them. We have winter and summer butter-making and the two systems are entirely different, the conditions are different, we have different temperatures, and we must be careful not to get them mixed. I would, I think, like Mr. Dean to explain it. He has machinery in his factory that they have not in every factory. As to the questions of seperating only twice a week, it is impossible to do that in the summer time.

Mr. DEAN: There is a great deal of difference. We have changes every day in September and October; they are two of the hardest months to make butter in. The

cheese-maker quits making cheese the last of October and starts in November. There is where their greatest difficulty comes in. After they once get started it is not so difficult. Where the cows have been milked quite a long time you have changes nearly every day, and you have to use a great deal of common sense to know just exactly what to do.

Mr. PRICE: I had a seige the other summer making butter right through the hot weather, and I found the importance of securing the proper amount of acid, and not allowing it to develop too far, and then cool the cream; there is a different process goes on then. If you can change this so as to bring about that result both winter and summer you will have better results. I think the lack of flavor in winter butter is that there is not a proper amount of acid developed.

Mr. MUIR: Do you ripen at the same temperature in winter as in summer?

Mr. DEAN: No; at seventy in winter, and at about sixty in the summer time. We are using a good deal more starter in winter than we do in summer. I think the quicker we can get the acid on the cream the better the result.

Mr. MUIR: About the same amount of acid in both cases before you cool it down?

Mr. DEAN: Yes, it does not take long to cool it down if you have ice in the summer.

PROF. DEAN: I think in the whole process of butter-making there is nothing more difficult than the question of controlling the ripening of cream, and although you may have good milk if you do not understand the ripening process, you will have difficulty, and that is where the scientific knowledge of the question becomes of value. Now, the ripening of cream is merely the growth of what bacteriologists call lactic acid bacteria and these work on the sugar that is in the milk of cream. Now, if you have cream very rich in butter fat, that means that there is very little skim milk there. That means also that you must make the conditions more favorable for the ripening or for the growth of these organisms; the thinner your cream the more skim milk, the more sugar, the higher the temperature, the more favorable for the growth of lactic organism. I think this is where the butter-makers make the mistake, because they do not understand the process of ripening cream. In the winter time we must make the conditions favorable for the growth of this organism, we must have a certain amount of skim milk there, and you will find it quite possible to get your cream so rich in butter fat that it is difficult to get it properly ripened. As to flavor of butter, which is the most important point, you will find in the scale the judges use, that half the points are given for flavor. Where does that flavor come from? It comes from the food which the cows eat, largely as a result of the ripening process in the cream; and the maker who understands the ripening process understands the most difficult part of cheese-making and butter-making. (Applause).

A MEMBER: Do you think it necessary to pasteurize?

Mr. DEAN: I think it is only by pasteurizing that you will get an even quality of butter. And it is just about as necessary in winter as in summer.

Mr. MUIR: How does the flavor of the pasteurized butter compare with yours?

Mr. DEAN: Letters from the old country inform us that our butter made at St. Marys has been compared with pasteurized butter from Denmark. The Danish butter seems rather flat. I do not think pasteurized butter would take in this country at all. I would not call it good butter; but that is what they want in the old country. They want a very flat flavored butter—what you might call a mild flavor.

Mr. BALLANTYNE: I think Mr. Dean is entirely mistaken in saying that they want a flat butter without flavor. While in England, I have taken a great deal of trouble going among the people who handle butter both in a retail and a wholesale way. I have gone to a number of the largest and best retail stores in England, just for that reason, to learn what kind of butter they want—the kind of packing, color and flavor they want—and I found that they did not want that very flat butter, but they would prefer that rather than bad flavored butter. What they liked about the Danish butter was that it was even in flavor. They could always depend on getting about the same quality of butter from Denmark, whereas if they got it from the United States or Australia or

New Zealand or Canada, it would have different flavors and would not be uniform. If they get butter always of the same flavor they always know what they can depend upon, and when they get their customers started on one kind of butter they can keep them there, so that they did not like a flat flavored butter, but on the contrary they liked a full flavored butter as well as anybody, and they keep pointing that out to you, that this butter is not full enough in flavor. They do not want a rancid butter, but they want a good flavored butter that you can smell some inches from your nose. I am fully convinced of that, because I have taken a great deal of trouble to find that out.

Mr. DEAN: I am speaking in regard to the house we deal with in Manchester. The buyer has been to St. Marys twice during the summer, and that is the report he has given us. We have shipped butter to London, Liverpool, Bristol and Manchester. Of course you must understand London wants a different butter to what Manchester wants, and I am speaking of what they want in Manchester where we have sold our butter at from eight to ten shillings higher than what the same butter would sell for in London and Liverpool.

Mr. BALLANTYNE: I spent two days in Manchester, and I asked to be introduced to some of the best Danish butter dealers in Manchester, so that I might see how butter was put up, and while there I went to the house of Willow & Riley, who are said to be the largest importers of Danish butter in Manchester. They showed me a great many samples of butter. They told me that some of the butter they had been getting of ours was flat in flavor, and not as full flavored as they would like it to be. They said they thought probably we were churning too sweet cream, and they would like us to keep a fuller flavor on the butter they were getting from us through another house. That is really my only experience of the Manchester business. It was through our own customers that I was introduced to these Danish men, and that they were getting some of our butter through our customers. Our customers were of the same opinion. They did not want a flat flavored butter, but they said by pasteurizing as they do in Denmark they had an even quality of butter, and they always know what they are getting.

A MEMBER: Will pasteurizing make a flat flavored butter?

Mr. BALLANTYNE: I understand that is the case. I do not know that it should theoretically; it seems to me that we ought to be able to put back the flavor through cultures, but the general verdict is that it makes a flat flavored butter.

Prof. DEAN: I do not like the term "flat flavor." I would prefer the term "mild flavor" for the butter, not that bouquet smell that is called for in Canadian and American markets. The high flavored butter quickly goes off in flavor; the mild flavored butter that you get from pasteurized milk or cream is a butter that will not hold its flavor. Pasteurizing gives a mild flavor, and a flavor that will be held by the butter for a long time, and will stand shipping better than butter that has been made from milk or cream not pasteurized.

The PRESIDENT: We pasteurized some cream in our factories in December and we found very little flavor of any kind to it. You can call it "flat" or "mild," but there is very little flavor to it. I asked for a special report on these packages, but I have not had time yet to get the returns. I think if you can get a flavor right without pasteurizing you will have a much nicer butter than you can by pasteurizing it.

Prof. DEAN: If you pasteurize you will have killed the organisms or germs that give the flavor. The ripening of cream is simply the work of germs or organisms, and when you have killed them then you must put into that cream other organisms which will restore the flavor again, and the trouble with a great many who practice pasteurizing is simply they have not put into that cream the right amount of organisms to give the flavor, or there has been something wrong with the method of pasteurizing; while we do not get that high flavor such as you would get from churning raw cream, yet with the use of a proper starter we can get a nice mild flavor from pasteurizing.

A MEMBER: Does pasteurizing produce an extra quantity of butter to the pound of milk? (Laughter.)

Prof. DEAN: No; pasteurizing does not increase the yield of butter from the milk. By ordinary good methods you can take all the butter there is in the milk out, and when you have got it all out you cannot get any more. The only way you can increase the yield is to incorporate a large quantity of salt or water or curdy matter; but such butter will not produce the highest price in the market. With a great many starters, where you separate at pasteurizing temperature of one hundred and fifty to one hundred and sixty degrees, you can skim closer than when separating at a temperature of seventy or ninety degrees. That is true of some kind of separators more than others.

Mr. BALLANTYNE: We have been shipping during the last few years butter from quite a number of creameries, and where the appliances are good and the men are good we have no difficulty whatever from any offensive flavor of any kind. I am speaking entirely of winter creameries. I do not think it is necessary to pasteurize in factories where they are supplied with good milk, and where they are now producing good butter; but if a factory was having any difficulty from bad flavors of milk delivered at the creamery, I would then say that factory should begin pasteurizing, but only in that case. Ordinarily speaking there is no necessity for it. I believe from what I have read, and from what I have heard other people say, that the yield would be slightly reduced by pasteurizing; that is, you would make a solider butter with less water in it. But people as a rule like a butter that will spread very freely, and a solid butter is not a butter that will spread freely. A butter with a large quantity of water in it is also objectionable. Taking all things into consideration, I think the butter we make now is better than butter made from pasteurized milk.

Mr. PRICE: A great many factories that pasteurize the cream and milk put the starter into it before it is cooled down, and it is from some of these cases that pasteurizing is not what it is cracked up to be.

REPORT OF JUDGES ON PRIZE BUTTER.

By PROF. DEAN, ONTARIO AGRICULTURAL COLLEGE, GUELPH.

I have been called upon to give this report, although there have been several other judges. We need to bear in mind that the personal factor is important in the judging of butter. If three or four men examine a package of butter, you will find there will be a marked difference in the opinion of these men. Individually, judges have quite an important influence on deciding which is the best lot of butter. However, assuming that you have secured the best men possible, the next thing is the standard that you are going to be judged by. If you are going to judge cheese or butter you must have a standard. The best way to make a standard is to have a score of points; and the score we used was: Flavor, 45 out of 100; grain, 25; color, 15; salting, 10; packing, 5. That score of points has been adopted by the Association.

We have a demand for two classes of butter—one for the home markets and another for the export trade. We had two kinds of packages to judge—prints and boxes. We judged the prints from the standard of the home market, and the boxes from the standard of the export trade; so that, when you get your score some of you may find them quite different, although the butter may be made in the same way.

Of the flavor in butter I would like to see the man who can describe exactly what flavor in butter is. It has been said it should be sweet, and clean, and mild, and pleasant, but that does not give us an exact idea as to what this flavor is, and, as far as I know, we have no exact words in the English language to describe exactly what it is.

With regard to the grain of the butter, my method of judging is as follows: I take a sample of butter in the tryer, put my left finger in the bottom, and run my left thumb along; and I judge of the grain and texture by that method. At the same time it is

always a good plan to look at the top of the "tryer," which should be clean, and not show any grease spots. Some of the samples left the "tryer" greasy. There should not be an excess of moisture. In some of the samples water would squeeze out. Of course, the butter must spread easily.

With regard to color we have two different standards. For the home trade we want a colored butter, and for the export trade a white butter. Here is a butter, well made in every way, but lacking in color. For the export trade you should have a mild flavor, and for the local markets a full flavor. The longer you keep a full flavored butter the poorer the flavor will be, and if we let the ripening process go on, the butter simply becomes rancid or rotten. We have a parallel case in an apple; there is a certain period when it becomes fully ripe, and after that it gets off flavor, and by and by becomes rotten, and it is the same with butter or cheese.

The Package. For local market there is nothing better than the pound print. Here is a man coloring his butter highly for the export trade; and here is another man putting his butter up in pound prints without any coloring in it. We want a high color for the print, and not in the box, for we want the white butter in the box. Taking a general survey of the butter, we found one or two samples quite badly off the flavor, scoring only thirty-five. I am quite satisfied that the person who made that lot could not have examined it before he sent it here, or else he is a very poor judge of butter. It was off flavor, as if it had been kept too long, or kept in a mouldy place. Some packages were badly salted, and the salt would grate in the teeth. What you require is nice, mild, pleasant salting, with the salt all dissolved. You must have a certain amount of moisture in your butter in order to dissolve the salt.

On the whole the packing was good. Mr. Ballantyne objected to one or two packages on account of a salt paste on top. The chief faults with the butter were, first, bad flavor on one or two lots. One lot was as nice in flavor as anyone could ask for. The color was wrong in a few packages, one or two samples were inclined to be pale, and a few samples were a little too greasy.

PRIZE LIST.

Package Butter—1st prize	J. R. A. Lang	Avonbank	97	points.
2nd "	Jas. Bristow	Sebringville	96½	"
3rd "	T. B. Marshall	Tiverton	96	"
Print Butter—1st prize	T. B. Marshall	Tiverton	98	"
2nd "	Thos. Malcolm	Kinlough	97	"
3rd "	Geo. A Boyes	Mapleton	96	"

A MEMBER: What was the objection to the paste on top of the butter?

Mr. BALLANTYNE: I think as far as my knowledge of the business goes that the paste on top of the butter is largely desired by those men who hold butter in cold storage. They wish it so that they will be able to hold the butter longer without any danger of exposure to the air, because the top of the butter cannot become mouldy. Now I do not know for a fact that retailers who handle the butter in England, and put it on the counter, do not want any paste. They want to be able to turn that butter out on the counters and cut it up, and they object to do it if it has paste, and more than that it gives it the appearance of butter that has been held.

A MEMBER: Would you like that pale color on June butter for export?

Mr. BALLANTYNE: Yes; but you cannot get it unless you pasteurize. I think that is one of the benefits of pasteurizing. I have not had much experience in summer butter-making, but you can get a good deal out of summer butter by pasteurizing, and in that way make it more acceptable to the English markets. Every place I was at they wanted pale butter, and in Manchester they wanted it paler than any other place.

A MEMBER: I would like to ask Mr. Doan if he could define the flavor on that butter that scored so low. I prepared the culture according to Prof. Robertson's idea of preparing culture, and kept in a clean sweet place. I do not know anything that would cause that flavor.

Prof. DEAN: The sample that scored so very low struck me as being a flavor due to keeping the cream in a place where there was dampness, or mouldiness, or something of that kind; or it might have been due to bad starter. How did you prepare your starter?

A MEMBER: I used butter-milk from the day before for the starter, and I used about a gallon of skim milk taken from the starter after being separated, and heated it to 170°, keeping it at that temperature for ten or fifteen minutes and then cooled it off, and kept it for a couple of days in the factory.

Prof. DEAN: When did you put the butter-milk in? When the skim-milk was at one hundred and seventy?

A MEMBER: No; I cooled the skim-milk before putting it into the butter-milk.

Prof. DEAN: Are you sure that your butter-milk was right?

A MEMBER: I am sure that it was.

Prof. DEAN: You pasteurize the skim-milk and kill all the organisms that would give a natural flavor, and when you put in the butter-milk, and if it was of a bad flavor, then you would have that bad flavor. The starter we use in the dairy school we have had for four months.

A MEMBER: I have used butter-milk right along, and I never had any bad flavor till I used this culture.

Prof. DEAN: Heating to 170° would practically kill everything in the skim-milk; you should have got a pure culture, and then kept propagating that day by day. Usually you get good starter by taking fresh milk from a fresh cow.

A MEMBER: I have had no trouble with butter-making till I tried this culture. I think it must be in the culture instead of in the butter-milk.

Prof. DEAN: You would have just as good results if you used the butter-milk alone.

REPORT OF JUDGES ON PRIZE CHEESE.

BY A. F. MACLAREN, M.P., STRATFORD.

PRIZE LIST.

White Cheese.—	1st prize	Mary Morrison	Newry	96	points
	2nd "	I. C. Goodhand	Milverton	95	"
	3rd "	Thos. Grieves	Wyandotte	94	"
Colored Cheese.—	1st "	Newton Cosh	Brantford	95	"
	2nd "	J. S. Isard	Paisley	94	"
	3rd "	W. B. Thomson	Brooksdale	93½	"
Special Prize.—	Rice's Cheese Salt	I. C. Goodhand	Milverton	95	"
"	Hansen's Rennet	I. C. Goodhand	Milverton	95	"
"	Hansen's Butter Color	Geo. A. Boyes	Mapleton	96	"
"	Rice's Butter Salt	J. R. A. Laing	Avonbank	97	"

I must congratulate you on the grand success of the first meeting of the Cheese and Butter-makers' Association. As a judge I congratulate the winners for the magnificent prizes they have won, and as a cheesemaker I congratulate ourselves on the magnificent display we have here to-day from all the contestants. I know you will all be glad to hear that the first prize is given to the Misses Morrison, who have won so many first prizes. (Applause.) They have presented their cheese to the Association to be cut up. I happened to have been judge on a great many occasions in Toronto and London, and on a great many occasions I have had the honor of giving the Misses Morrison first prize, and on many occasions I have been accused of being partial, and some cheesemakers would say there is no use sending cheese to Toronto or London if McLaren is judge, because he will give the first prize to Miss Morrison. Associated with me as judges on this occasion were Prof. Dean, of Guelph, and Mr. Dillon, of Prince Edward Island, and Dr. Ballantyne, of Stratford, and on this occasion the Misses Morrison took first prize,

and I think that is the best evidence to show that I have been just in my judgments heretofore The second prize goes to Mr. Goodhand, of Milverton factory. The Milverton factory is one that we are all proud of. Then we have my old teacher, the man I made cheese with the second year I was at the business, Mr. Thomas Grieve, of Wyandotte ; he has secured the third prize.

The first prize cheese will be cut up and distributed. I can tell every person here that if they want an object lesson on cheese-making they should go to the Misses Morrison's factory ; you could eat your dinner on the floor of the making house, or in the curing-room, in the vat or in the whey tank. I do not know any factory in the Dominion that is more clean and tidy; and I wish all the cheesemakers in this country would keep their factories as clean, and that next year you would make every cheese equal to the cheese that has secured first prize here to-day. (Applause).

Mr. R. M. Ballantyne : The first prize white cheese scored 96 points, the colored one 95. The score was as follows : For flavor, 45 ; texture, 30 ; color, 15 ; finish, 10. White cheese scored a point more for flavor. I think possibly it might have scored one point more for flavor, but the judges were anxious to keep the scoring down, so that in case there should be anything very excellent they would have room to go up a little. It scored 28½ for texture. I think there was some small defect in it that caused it to lose 1½ points. It scored 15 for color, the color being perfect. Finish, 9½ ; the finish was as nearly right as could be, but somebody had one that scored a little nicer in finish. The flavor is, after all, the guide of the judges, and is the guide of the buyers when buying. When a buyer comes to your factory the one thing he notices from the time he enters your factory till he gets out is the flavor. The best colored cheese scored 95 points in all—42½ for flavor, 28 for texture, 14½ for color and 10 points for finish. Both first prize cheese were made on the 20th September.

A Member : Do they return the whey at these factories?

The President : The Morrisons return the whey. At the other factory they feed at the factory.

Mr. Ballantyne : There is not more than one factory in a hundred that has its whey tank and surroundings as clean as the Morrison factory, and I think greater care is taken with the cans even after they leave the factory.

The President : A great many of the patrons draw their own milk, and it is taken home and the cans cleaned. I know in a great many factories where the whey is returned, the whey is not emptied from the cans as quickly as it should be ; and I have gone along the road many times and found whey in the cans at six and seven o'clock.

Mr. McLaren : The Misses Morrison have separate cans for drawing the whey back.

NOMINATING COMMITTEE.

The following were appointed as a Nominating Committee : Robert Johnson, Bright ; A. T. Bell, Tavistock ; T. Nimmo, Ripley ; W. A. Edgar, Culloden ; James A. Gray, Wallace.

ADDRESSES OF WELCOME.

Mr. Hacking, Mayor of Listowel, delivered a hearty address of welcome, and called upon Mr. Morphy, secretary of the Citizens' Committee, to read the following address :

To the Officers and Members of the Cheese and Butter-makers' Association of Western Ontario :

The citizens of Listowel beg leave, through this committee duly appointed at a meeting called for the purpose, to express the liveliest satisfaction that your Association

have seen fit to honor them by holding your first annual convention in this town. We hope you will accept this statement in its fullest meaning, since we are prompted to make it, not only from a sincere regard for the class of men and women of which your association is composed, but also from a knowledge and appreciation of the great benefits conferred upon the country, and the town of Listowel in particular, by the growth and expansion of the cheese and butter industry in this and other neighborhoods, owing largely, we believe, to the intelligent thought and application of the practical cheese and buttermakers of Ontario.

How far we are justified in these expressions may be easily seen from a perusal of the following short table relating alone to the cheese trade in the Listowel district, the figures being taken from official sources: In 1897 the quantity of cheese made in the counties of Huron, Bruce, Grey, Wellington and Perth, a large percentage of which was marketed at Listowel, aggregated 13,365,686 pounds, and sold for $1,228,324.00; out of a total production in the Province of Ontario of 137,362,916 pounds, which sold at $11,719,468.00. There were in the above named counties in 1897, ninety-one cheese factories in operation.

In the adjoining township of Elma alone there are eight factories in operation, besides three on township boundaries having a large number of patrons in Elma. We have, therefore, every reason to assist and encourage your Association, which aims to maintain the high and honest standard attained by Canadian cheese and butter in the markets of the world, and especially in Great Britain.

We hope that your convention may result in great good to yourselves and to the cheese and butter industry of Canada and that you shall establish yourselves so firmly in the confidence of the people that you shall continue to grow and prosper to the benefit both of yourselves and your country.

In conclusion we hope your visit may enable you to carry away lasting and pleasant recollections of our people, and that in the near future we may be favored with another visit from you, when we shall do all in our power to render it enjoyable.

Mr. G. H. Barr made a suitable response on behalf of the Association.

HINTS ON CHEESEMAKING.

Mr. T. J. Dillon, of Charlottetown, P.E.I., then delivered an address similar to that given in the report of the proceedings of the Eastern Cheese and Butter Association at Kingston. (See page 40).

PREPARATION FOR DAIRY WORK.

By G. G. Publow, Dairy Instructor, Kingston.

I am sure I must congratulate you on this your first annual convention of the Butter and Cheesemakers Association, and upon the large number you have at this meeting. I am sure that there has been great need for a convention of this kind, or a movement in this direction, and I assure you I am in sympathy with this convention and the work that is before you. I might say that there is a great work before you, and you want to be careful in the way you start out. I think that each maker should fit himself thoroughly for the work that is before him. You want to enlist the best men into your Association, and you need the best makers of this country to join you. I would say in starting out with your season, this year, to select the brightest men or boys you can get in this country for your assistants; they will be more credit to you and they will be better men for the business. It has been said cheesemaking is an easy job. I did not find it so. I found it a very hard business to become master of; and so we have all the more need of bright men, ambitious men. Anybody can do an easy thing but it takes

the best men to do a hard thing. I congratulate you on the exhibit of cheese and butter that you have had at this convention. We had a very poor showing of cheese at the Kingston convention this year, and the judge said they were not worth the gold medal. I might say, in looking over these cheese to-day, judging by the flavor, you have the same weeds in western Ontario that we have in the east. Another thing I would like to draw your attention to is signing of agreements with the managers of factories this year. You want to be careful. If you have never made cheese in the factory before, you had better go and see the conditions of that factory, and unless the owner or manager will put it in first-class condition, if it is not in that condition, do not sign an agreement to make first-class cheese in it. I would also require the patrons of that factory to sign an agreement to me that they would milk with clean hands, and that they would strain the milk immediately after milking and keep the milk in a clean atmosphere.

In getting ready for cheesemaking in the spring, go to your factory a week or two weeks before it is time to open up, make a thorough inspection of the building and surroundings. See that everything is in apple pie order. See that your whey tanks are so situated that they can be thoroughly cleaned out. If not, have it done before you start to make cheese. Examine your making-room, your vats, your press, your boiler, and all the utensils and the factory. Do not forget the steam valves; see that they are not lacking in repairs that are required, and have them attended to before you start to make. Examine your curing-room and see that there are no moulds around, or that the walls are dark and dusty and the shelves dusty. If they are, take the shelves outside. If they are very dirty take them to the planing mill, and run them through the planer. Get some of Gillet's lye and warm water, and soak the shelves for a while; let the lye lie on there for a while, and afterwards scrape it off and then use boiling water. Leave the shelves out for a few days, as you will probably have to wash them over again. If the curing-room has been musty, and the walls dark, I would advocate whitewashing it giving it a second coat. Get everything thoroughly clean before you start to make cheese.

When you step on the weigh stand, be clean and tidy yourself. Invite your patrons into the factory, and let them see if they can find any fault with your utensils or anything with regard to the factory. Show them how to do things, and set them an example by having everything thoroughly cleaned. If a patron brings tainted milk, or if his cows are not clean, do not send it home till you get cleaned up yourself; I do not think you have any right to do it. I do not think you are ready for making cheese until you have your factory in proper shape.

THE GROWTH OF DAIRYING.

By Prof. H. H. Dean, Ontario Agricultural College, Guelph.

In the citizens' address to this Association they expressed a wish that the Association would grow, and I think that is an excellent idea—growth. I am sure that everyone who is interested in the welfare of the dairying industry will wish this young Association a growing time. What is necessary to growth? Growth implies that there is life, and life pre-supposes that there was a pre-existing life. Life cannot come from nothing. Life must come from life. And then, in order that there shall be life, there must be conditions favorable for the support of life. In order that there should be growth, there must be life; and in order to maintain life it must have certain favorable conditions. Away back in 1864 a plant was brought from the State of New York and planted in the soil of the Province of Ontario; and we have to day this transplanted plant—the great cheese industry—which has grown so that it is larger than, and better than, the original plant.

I had the pleasure last week of visiting New York State Dairymen's Convention, and I must say they treated the men from Canada right royally. I enjoyed the meeting splendidly, and I said to them there, "We in the Province of Ontario are going on, and if you keep on making the embalmed beef and embalmed cheese and so on, we will

leave you further behind than we have ever done before." What is the use of our boasted civilization, and what is the use of our Dairymen's Associations, and our Butter and Cheesemakers' Association, and our Dairy Schools, and our Instructors, and our tons of literature, which are being put upon the people of this country, if we do not improve? We would not be men if we did not improve under these conditions; and unless we keep on improving and making growth in the dairy industry, I tell you we shall soon go back. We have heard from various quarters that there have been complaints about our cheese. Why? Because we have been satisfied with past achievements, we have been satisfied with the reputation acquired in previous years. The growth has stopped. That life to a certain extent has ceased. There has not been that throbbing life in our cheese trade and dairying that there has been in the past years, and what these Buttermakers' and Cheesemakers' Associations have to do is to put new life and new energy into the industry, and as that life begins to grow we shall find that we shall gain the position we formerly occupied. Let every one try and put new life into the business, and we shall have increased profits to the people engaged in the industry. In order that we may have favorable conditions for maintaining this life we must study closely the wants of the future. There are four factors in modern dairying, and these must be kept growing or life must cease to a certain extent. These are, first the producer of milk, second the manufacturer of milk, third the seller of milk products, and fourth the consumer of milk products. We must infuse new life into these four factors in connection with our dairy industry, if we are to make the progress we have made in past years. With regard to the first, the producer of milk, I should judge that we need to have better cows, fed on cheaper food, and we must have the milk better taken care of. That subject was touched on and thoroughly threshed out this afternoon. I will give you the figures from our dairy herd, and you will find full details in our annual report. I went down to the stable yesterday afternoon, and I got the figures of the pounds of milk and pounds of butter, and the cost of feed and profit from six cows in our herd, two of each of three distinct breeds. We are being continually asked, what is the best breed of cows? There is just as much difference in the individual animals of the same breed as there is in the different breeds. The figures are as follows:

Cow.	Pounds of milk.	Pounds of butter.	Food cost.	Profit.
			$	$
No. 1	7,611	437	28	59
" 2	3,035	186	20	17
" 3	8,779	416	39	44
" 4	6,335	221	24	20
" 5	9,793	358	45	26
" 6	5,992	217	31	12

We sold all our butter at 20 cents per pound. Cows number 3 and 4 are of the same breed, same care, same conditions. Cow number 2 is of the same breed as number 1.

Though cow number 5 was the best producer of milk in the herd, when we took into consideration the cost of her feed, she only gave us a profit of $26.

The point I want to impress in this connection is that we must get the very best cow possible, and in selecting breeds we must not be under the impression that any one breed has all the excellencies of the dairy cow; and we must remember that there is just as much difference in individual animals as there is difference in the breeds themselves.

The next class in this dairy industry I want to see growing in mental ability and power to do work, and I am glad to know that the butter and cheesemakers of Western Ontario have given a set back to the idea that people that work have no executive ability. In regard to the manufacture of milk I say we need more skillful makers, and that these makers should be provided with better buildings and equipments. I had a letter the

other day from a man who writes as follows: "I propose to build a combined cheese and butter factory this coming year. I am going to make it one of the best factories, sparing no expense, and I want to get a maker who understands the scientific principle of butter-making and cheesemaking, and who can put these principles into practice." There is where so many makers fail, and that is a difficulty we find with the graduates of our dairy schools. They take a course in the dairy school; they hear the lectures and see the practical work; and when they go into factories they cannot put these principles into practice. They meet conditions which are unfavorable, and they do not know how to put these principles into practice. And he says further: "I want the man that can keep things neat and tidy, and for such a man I am willing to pay a good yearly salary." We are on the lookout for that man yet, for it is not every man who will fill the bill in that respect. And the world to-day is on the lookout for that kind of a man, in order to make this dairy industry grow, and in order that the man who owns the cows and the men who manufacture the milk and have anything to do with the dairying business shall be able to make an honest living and pay off their debts and at the same time receive some of the comforts of life. Some good makers are provided with such poor buildings and poor machinery that they cannot make good cheese. I would like to say to every owner of a factory: Make an honest effort to put your buildings and equipments into first class shape before asking the cheesemaker to go into it next spring. I think even the best of factories depends too much upon the cheesemaker, and I belive the men would do better work if they had a little encouragement now and again.

Now I wish to speak of the curing of cheese. We have heard a good deal during the past years, and this year, about faults in Canadian cheese, and while no doubt in many cases the fault was due to bad milk or improper manufacturing, I am satisfied that many of these cases, especially of bad flavors, may be traced directly to faults in the curing of cheese. In fact I am inclined to think that in the future the curing of the cheese will be a separate business. If the average cheesemaker to-day gets a can of milk or a vat of milk that is over-ripe or smells gassy, he knows what kind of treatment will apply to that to get the best results; but tell me how many cheesemakers there are who know just how any particular kind of cheese, when it comes out of the vat, should be treated in the curing process. I have heard it said many times that a cheese is only half made when it comes into the curing-room, and I am satisfied that the curing of cheese will in time form a separate business, and that when a man puts his tryer into a green cheese he will know what temperature it requires and the moisture it requires to get the best results. In order to obtain that I am satisfied we shall have central curing-rooms, where the cheese will be sent from a number of factories—one central place built in the best possible manner, with a good man in charge. Secure a man who understands the curing of cheese thoroughly to take charge of the building. One word about this curing of cheese. So far as our studies have gone they have related to two points—the effects of temperature and the effects of moisture in the curing of the cheese. You can understand that in the making of any experiment you simply take it one line at a time. There are so many who expect that the experimenter will cover the whole field in one season, and that everything that is known about cheese and butter should be experimented in one season. That is impossible. You must give the men that are doing that kind of work time to think and study this question, and it takes a good deal of time just to follow out one particular line. We have studied the effects of temperature and moisture, especially temperature, and we find that cheese cured at a temperature of 60° have given us the best results; and when cheese goes up to 70°, or above that, there is a decided loss in the quality of the cheese both in flavor and texture.

Mr. Steinhoff examined some of these cheese, and said he was prepared to pay a half a cent more for the cheese cured at 60° as compared with those cured at 70°. I am satisfied that the cheese should not at any time go above 65°. My chief reason for saying so is the following principle laid down by a very celebrated German dairy bacteriologist. He says: "In all fermentation processes the best and finest results are obtained from the processes that require comparatively the longer periods of fermentation." That is the conclusion of a man who has made a special study of the curing of cheese, which

is nothing more than a fermentation process. We are in such a hurry that we destroy the best quality of the cheese. The lower the temperature at which we have the fermention process going on, the better will be the result.

If we had all our surroundings perfect—air and everything perfect—and if we could take more time in the ripening of our cream, and use less starter, I think we could get the same results as in the ripening of the cheese. The ripening period of cheese may be considerably shortened by reason of the temperature of air in the store room, but this can only be done at the expense of the average good quality of the cheese. First, he says, we get the best results from a comparatively low ripening temperature. Secondly, if we raise the temperature we do so at the expense of the quality of the cheese.

There are three methods in use of controlling the temperature in the curing-room. There is the ordinary box stove, which sometimes stands in the middle of their rooms, and sometimes in the corner, with the result that the cheese next the stove have the grease boiled out of them, and the cheese in the further corner of the room are cold.

Then there is the furnace method, and the men who have tried that speak of it highly; but, for myself, I would prefer a system of heating with pipes. If we are running our factories the year round we always have the boiler going, and always have steam there, and it will be less labor and more satisfactory to have the firing all done at one place. Take a room 30 by 40 and ceiling 12 feet; for such a room it would require 700 lineal feet of inch pipe. That 700 feet of inch pipe would cost put up in the curing-room about $55, and you cannot buy a furnace for very much less than that that will do the same amount of work. The reason I would advocate the pipe method would be this, that these pipes might be made to suit a double purpose and you might use these same pipes for cooling the room, you can pump water through these pipes and around the room and afterwards use the water in your tanks for washing; theoretically there would be no more water pumped than in an ordinary factory. I have talked with our engineer on that point, and he said there is no reason whatever why pipes may not be used for this double purpose.

If you do not have the pipe system you may use ice and it will give you satisfactory results. The one objection I have to it is that it is a good deal of labor to take in ice, and to get the melted ice away out of the curing room, and then the third method is the sub-earth air duct. I have here a photo of the duct as it appears. It consists of drain tile put into the ground. (For full description see report of Western Dairymen's Association.) We not only find that by keeping the temperature down we get a better flavor and better texture, but there is less shrinkage in the cheese. We found the shrinkage was about one hundred per cent. less by curing at 60° compared with curing at 70°. That means one pound more on every hundred pounds of green cheese, and for a factory making one hundred tons that means one ton extra by curing at a lower temperaure. We have more moisture in the cheese, a better texture of cheese, and a cheese that will not go off in flavor. It has been found by bacterioligists that the organisms that produce bad flavor in cheese require a high temperature, and the moment you get your cheese above seventy you make conditions favorable for producing these organisms—there are two advantages, better flavor and texture, because we make the conditions more favorable for the growth of the favorable organism, and then there is less shrinkage in the cheese, amounting to about one per cent. I do not think there is any person here who has anything to do with a factory who can afford to open up next spring without being able to control the temperature. A curing-room ought to be lined. We first put on two ply of building paper around the walls and ceilings; then we put on a two inch strip and then matched lumber. A room 30 by 40 and 12 foot ceiling can be thoroughly lined at the cost of $135. The cost complete would be about $135 for lining the room, and say $100 for the sub-earth air duct, or pipes, or ice. I do not think there is any factory making over fifty tons of cheese that could not afford to spend somewhere about $200 or $250. How will you get paid for that? By increased price of the cheese. Assuming you are able to increase the value of the cheese one-eighth of a cent on one hundred tons that would mean $250; and on a conservative estimate you

would get back in one season the total cost of putting that curing-room into good shape, to say nothing about the increased weight of cheese as a result of less shrinkage.

Remember that one word "growth." The seller of dairy produce needs a training in the selling of these goods. I am not going to say anything against cheese buyers, for I like them. But let me tell you that the men who are acting as salesmen of our factories to a large extent have to guard the reputation of the maker. They stand between the cheese buyer and the reputation of the cheesemaker or the buttermaker. Unless he is a man who is up in his business, and who knows what good cheese and good butter are, he very often will let the reputation of the cheesemaker become tarnished when he might have saved that reputation; and I hold that the men who are selling dairy produce to-day need to have a training in their particular line just as well as the men who make the goods. I hope the time will come when we shall have somewhere in this country a school or convention at which salesmen of dairy produce may take lessons in the business principles and best methods of disposing of their produce. Why? Because they have to meet the men who are the keenest, and shrewdest business men, perhaps, of this country. You can see in a moment what the result will be. Here is a man who does not know anything practically about business, who has no business training, he meets a sharp, shrewd business man and what is the result, and which will come out at the little end of the horn? It is perfectly honest for the buyer to get that produce at as low a price as he can, and it is perfectly legitimate to the seller to get as high a price as he can. If the seller lacks any necessary business training, he is not going to hold his own with the other men in the business. I hold that very often the cheesemaker's reputation suffers because the men who are selling their produce are not able to guard that reputation, and any man who acts as salesmen of a factory ought to know what is good cheese and good butter. Yet I think the makers will bear me out in saying that there are many salesmen who have very often no idea of what is good cheese and butter. Such men ought to try and make themselves conversant with what is good cheese and good butter. Mr. MacLaren and Mr. Ballantyne have given an honest opinion to-day of what they think is good cheese and good butter, and we ought to profit by it.

Then again we desire that the wants of the consumers shall grow. It is not sufficient that the producer of milk shall grow, and the manufacturer grow, and the seller shall grow, but we want the consumer to grow and keep pace with the growth all around. We can accomplish that to a certain extent by studying the wants of the consumer. I was struck with what a man said down in the States. They have given up largely catering to the export trade and were catering to the home trade, and they said they made it a special business to go and find out from the people buying their goods what they wanted. We should take a lesson from that, and find out what the consumer wants, and by so doing we shall be able to cause a growth at that end of the business. The man whose pocket-book looks as if an elephant had stepped on it needs to consider, and they had these problems coming up at the last meeting. One was what to do with the by products? I am satisfied that the skim-milk and whey are open to profit, and an important source of revenue. As a result of experiments made at the College, where hogs were fed on dairy by-products and hogs not fed on them, in every case it was found that the hogs fed with skim milk, did not give a soft bacon, and as our people find this out and apply this knowledge it will be another source of revenue. If we study all these lines, and make the best use of our opportunities, I am satisfied the dairy industry will still grow, and there will still be money in it for all those engaged in the dairying business. (Applause.)

Mr. EDGAR: Would it make any difference to have the outer end of the sub-air duct higher or lower than the curing room?

Prof. DEAN: We have our sub-earth air duct connected with three apartments in our curing room, and its outlet from one of these apartments is five feet higher than the inlet, and the outlet from the other apartment is five feet lower, and both are equally good in drafts, as far as I can see.

Mr. BELL: Would it be better to bring the inlet into the centre of the room?

Prof. Dean: Ours is brought in about six feet past the first wall, and if I were bringing it into the curing-room, if only one room, I would bring it in at one end and have the ventilation at the other end, so as to create a current of air right through the room; and I think that would give better results. I would recommend bringing the cool air in at one end and taking the warm air out at the other.

W. Brodie: I would like to ask about putting pipes into the curing room. In what position would you have them placed?

Prof. Dean: We have them about a foot and a half in the floor and in our rooms they go right around the sides. In eastern Ontario I think the practice is to put the pipes to the stand. Suppose you have a double row of shelves and a post in the centre, the practice there is to run the steam pipe between the two rows of shelves. I think that system would cause the cheese nearest the pipes to become too warm, and our practice is to put the pipes round the sides of the curing room. Perhaps Mr. Publow can tell why the eastern men put them there, between the racks or shelves.

Mr. Publow: Just to have the heat where you require it. We have not found any trouble from it. They are right in the space between the shelves, about a foot from the floor.

Mr. Dillon: I was in the Township of Malahide a few weeks ago, and we were trying to have the water run through the pipes, and laid it out to have the pipes high up for the water. Have them run up and down between each second row of shelves, and then by having a union where these pipes go into the curing room, a man can take out about two feet of pipe and let the other pipes down and shift them so that they will just come below the shelves, and it is attached to the steam pipes for heating. I think that system will give perfect satisfaction.

Prof. Dean: It strikes me that would not be necessary if you put your pipes on the wall. Put them within a foot and a half of the floor and that would answer every purpose; the foul air goes to the bottom and the warm air rises. If you have them two and a half feet from the floor, I think that will give good satisfaction for either heating or cooling. The same principle which applies in heating will apply in cooling.

RUNNING OF SEPARATORS.

By Mark Sprague, Ameliasburg.

One of the common properties of matter is its indisposition to move. This is manifested in a body by the opposition it offers to any change in its motion. Any such change must be effected by force. In all the older methods creaming was effected through the influence of gravity which is practically always the same. It is quiet different, however, in creaming milk with a separator, for in this method the aim is to separate the fat by centrifugal action, which is much more powerful than the force of gravity. The natural force of gravity, which is universally and at all times available, and which was exclusively used in cream-raising, acts with uniformity, and requires a certain time in which to obtain the best possible results. But even under the most favorable conditions it fails to obtain complete separation of the fat with varied or mixed milk. More perfect separation, and a shortening of the time necessary for creaming milk, can only be effected by the application of a force which will impart to the fat globules a celerity far exceeding that given by gravity. This force is centrifugal, and it is from this the machines for creaming milk are named centrifugal separators, and it can be applied in such a manner that its force exceeds that of gravity more than a thousand times.

It is only necessary to subject the milk to a rapid rotary motion in a suitable vessel to produce this force, having suitable arrangement when at work that a continuous stream of milk can be admitted, and give out in return separated cream and skim milk, to be termed a separator.

That portion of a separator which is to hold the milk, and is called the bowl, forms the essential part of every separator, and revolves around a vertical axis, and must always be a rotating body of necessity, made of good material to withstand the lateral pressure to which it is subjected.

The milk, when in the separator bowl, may be said to have much the same conditions and action take place as when it stands quietly at rest in a pan or can. Just as milk when it is poured in a steady stream into a can finds at once the lowest part of the can, which is the bottom, and spreads itself over the bottom in a horizontal layer, and gradually fills the vessel from botton to top, so does milk allowed to flow into a separator bowl when at speed find its way with lightning rapidity to the most distant part of the bowl, spreading out into a cylindrical surface until the bowl is gradually filled from the outside to the inside.

Just as milk standing in a milk pan at rest exercises a pressure on the bottom and sides of the pan, due to the force of gravity, so precisely milk in a separator bowl in motion exercises a pressure on the sides of the bowl, which is due to centrifugal force, and is in proportion to the speed and diameter of the bowl, as the fat globules move upward in the pan in a direction opposite to that in which the gravity acts. So also the fat globules in a separator bowl filled with milk and in motion travel in a direction opposite to that of the centrifugal force, or inward, or from the outside to inside of the bowl.

Separator bowls are so constructed that the milk flowing in is delivered into them near the circumference or at a point outside of the perpendicular layers of cream, to avoid the milk passing with force through these layers and displacing them, and thus interfering with perfect separation. The outflow of cream and skim milk from a separator bowl takes place with considerable force or energy, and is proportionately equal to the speed at which the bowl is driven and the distance from the axis at which it delivers, and in order to reduce the force as much as possible to avoid whipping the cream, the exit for the outflow of cream is placed as near the axis as can be.

The outflow of cream and milk together, equal the amount of milk which flows into the bowl in a given time. The proportion of the weight of cream to skim milk is determined by the rapidity at which the milk flows into the bowl, and in all separators the thickness of cream can be regulated at will by this means when the separator is at speed. For this reason in almost all separators there are arrangements whereby it is possible to regulate the quantity of cream with a uniform inflow of milk, and to adjust the separator to skim milk successfully of different percentages of fat and maintain a normal capacity.

The three main points to be observed in operating a separator are: feed, speed and temperature of the milk. The greater the feed of milk entering a separator the shorter the time it can remain in the bowl exposed to the centrifugal force, and if the feeding be carried beyond a certain limit there must be more or less imperfect separation of the fat from the milk. This can be determined by the flow of cream, for, as has been stated, the quantity entering the bowl equals the cream and skim milk from it. The thickness of cream is regulated by the feed, and consequently if the cream be too thin it is an evidence of its not having been retained in the bowl sufficient time to complete the separation. The feed should be even and regular, as nearly as can be.

There is to every separator a safe and proper speed at which the best results are obtained. This is usually stamped on the bowl, and is as high a rate as the manufacturer feels secure in recommending, and this should never be exceeded to any great extent, as it might result in injury to the separator, or the operator, and perhaps to both. It is essential, however, that the desired speed be maintained regularly and evenly while separating, remembering that any cause that might demand higher speed can be met by reducing the feed.

Temperature of the milk to be separated, the mode of and time of tempering before it passes into the separator, are all important factors in successful and exhaustive skimming. Higher temperatures increase the difference in specific gravity between the fats and other parts of the milk, provided time is allowed for expansion of the fat to take

place before it passes into the separator, which is about three to five minutes. It also reduces the viscosity of milk, making it more fluid, when it will flow faster and offer less resistance to the transit of the fat through it toward the centre of the bowl, thereby increasing the capacity and effectiveness of any separator. Large amounts of milk should not be heated to a temperature suitable for separation, in any case, as the formation of lactic acid and the coagulation of the albumen go on so rapidly that the milk is in a condition to leave a residue which adheres to the sides of the bowl, clogging the skim milk outlet, making it necessary to stop oftener than would have been the case if smaller amounts were heated as required.

The Best Separator? It is usual to be asked this question, and to answer it. In my opinion there is no such thing, as no one separator contains points superior in every respect to all others. And, again, a separator for one may not be suitable for another. It is not in accordance with the eternal fitness of things, and the patent laws, that it should be. The value of a separator is determined chiefly, though not exclusively, by its capacity for work. This is best measured by the quantity of milk which it can cream in an economical manner at a fixed cost.

It is also very questionable whether circumstances may not exist in which, where very slight differences in their capacities exist, the less capable of two separators may be preferable, since it may possess certain advantages which appear to be of little importance and yet may have a material value in the circumstances in which they are used.

ECONOMY OF FUEL IN CHEESE AND BUTTER FACTORIES.

By E. Agur, Brownsville.

Our cheese and butter factories of the present time cannot be operated without the steam boiler. And as the boiler is constantly in use during the cheese season, and which is closely followed by the butter season, which continues in many factories all winter, a boiler under constant work should be carefully looked after in order to prevent heavy bills for fuel and repairs. The fuel bills in our average cheese and butter factories are 25 per cent. more than necessary. Now, what does that mean?

I will underestimate the number of cheese and butter factories in the Province of Ontario and say there are 1,000. Now each of these 1,000 factories on an average will burn 100 cords of short wood in a year, and I will put the price of this wood at $1 per cord. Each factory burns 100 cords, and 25 per cent. of 100 cords is 25 cords, which at $1 per cord is equal to $25 saved in each factory, and as I have put the number of cheese factories at 1,000 and can save $25 on each, in other words $25,000 annually goes up the smoke stacks of our cheese and butter factories. Can this enormous waste of fuel be prevented? I say yes, simply by keeping the boiler in first-class order, which means considerable. You must be thorough in the details. Keep the boiler clean inside and out, clean out the flues twice per week. Start fire slowly by keeping about half the draft shut off, and never force the fire with full draft turned on, for that means a rapid consumption of the fuel in proportion to the amount of steam generated. Start the fire early enough to raise steam with a slow draft to say 80 lbs. pressure before you require to use the steam for any purpose. You will find the steam very dry at 80 to 100 lbs., which gives it much more power for heating vats or for using it through an engine. Keep all steam joints perfectly tight. Allow no leaks about the boiler pipes or stems of globe valves, and carry 80 to 90 lbs. of steam, which means economy in fuel, for at this pressure steam will make very rapidly, which calls for a good working safety valve set to blow off at 100 lbs. Keep the brick work tight, allow no holes or cracks, or else the cold air will kill the effects of the fire. Should the brickwork become cracked or holes set in it, get a little mortar or clay and plaster them up. Do not allow any cold air to enter any place about the boiler but through the fire, and keep the grates well covered while making steam, keep the draft closed at all times only when you require steam. Now,

just a word about the man in charge of the boiler and engine and then I am done. He will require skill along this line of work just as much as a cheese or butter-maker requires skill along his. He should prove a success as a fireman and take pride in his work, keep his boiler and engine clean as well as a fireman—as our cheese and butter factories have so much costly machinery which needs careful attention from some particular person—and the man who is capable to fill the position is worth as much wages per month to the owner of a chesse and butter factory as a first-class cheese or butter-maker is. Where it can be done I believe in letting the butter-maker look after his butter and the engineer his fire and machinery. As to the economy in fuel there is no secret about it. You must understand your work and be able to give the boiler the advantage of the work. Provide plenty of dry wood, use good common sense, and the boiler will do the rest.

Mr. BRODIE: Have you had any experience in burning coal, or would you prefer wood?

Mr. AGUR: I have never had any experience with coal, I have always used wood. I find at the price I can obtain wood that it is cheaper than coal.

Mr. BRODIE: Do you burn hard wood or soft wood?

Mr. AGUR: It does not matter; I would just as soon have hard wood as soft wood. I find soft wood actually worth more money in proportion than the hard wood is. You can burn the soft wood with a slower draft.

Mr. WADDELL: Do you not think the majority of our factories are fitted up with boilers too small to do the work, causing us to force the fire too much and by this means causing us to use more heat than is necessary?

Mr. AGUR: I think some of them are too small. At the same time I do not know any machinery in the factory that is more neglected than the boiler. I have had experience with boilers, some of which I have been told were no good. I have gone in and cleaned them, and fixed them, and I would not wish better boilers. I was in a factory one time that was making 150 tons of cheese with an eight-horse power boiler, and they said it was too small. In the spring, before I started, I got the managing director, and I said "we will open up the boiler and see what it is like inside." We opened it up and the bottom of the tubes six inches from the bottom, at the end of the boiler, was chocked with scale and mud. It does not take much time to clean a boiler out, and if they were kept clean they will make steam.

Mr. SLEIGHTHOLM: Do you consider an eight-horse power boiler sufficient for 150 ton factory?

Mr. AGUR: Yes, I find no difficulty whatever in running it with an eight-horse power boiler, and I always had steam to spare. I can run six days with a cord of short wood. I have a twenty-horse power boiler.

Mr. SWEET: Do not you consider you save more fuel in doing the same amount of work that you would with an eight-horse power?

Mr. AGUR: I would not get a boiler too big, if an eight-horse power would do the work. I can run with much less fuel with the eight-horse power that I would with the twenty. I could do more business to-day than I have got. I can do it with fifteen-horse power and have steam to spare.

A MEMBER: What about the attention necessary?

Mr. AGUR: It may require a little more attention. You would want to fire it perhaps a little oftener, but that would be about all the difference.

Mr. PRICE: Give us the cost of the separation of one thousand pounds of milk?

Mr. AGUR: This fall, in the last week in November, when that cold weather came on, I measured out three cords of soft wood and I made some experiments. At that time we were receiving milk with ice on it coming in—some as low as 32 degrees. I made some experiments that week, and I found that I could put that milk through the separator at a temperature of 108 degrees, and it did not cost me over three cents a thousand for fuel.

Mr. MUIR: Do you think it would be more economical to have a fifteen-horse power than a twenty for the work you have to do?

Mr. AGUR: I do not think it would be any more expensive; it would not be any greater anyway.

Mr. BARR: About what space would you prefer to have the boiler from the earth work to the brick work—say a twenty-horse power boiler ten feet long?

Mr. AGUR: I have a space in my boiler of about 18 inches from the back end of the boiler to the brick work. When I got the boiler the plant called for more, but I thought the space too big.

Mr. BARR: I mean from the grates to the back of the boiler—the space between the boiler and the brick work.

Mr. AGUR: I have about twelve inches in my boiler, clear all the way back right into the centre of the boiler; there is something in that. If you allow ashes to fill up too close to your boiler the heat does not go back into your tubes, but strikes to the front and it will burn your grates out in but a very short time. I find when ashes are close to the boiler the grates are red hot two-thirds of the time. In the boiler I have got you very seldom find them hot, and they are as straight to-day as the day they were put in.

Mr. SWEET: How soon do you allow the brick work to strike your boiler?

Mr. AGUR: I keep it away till it gets up to the high water mark, and then I bring it right straight into the boiler, and I have a space about four inches in the swell of the boiler.

Mr. BARR: In talking to men who have built boilers, some claim about five or six inches is enough, and others claim that it is not close enough. They say you want the flame to spread up and strike around your boiler instead of coming around to the flue. I had my boiler filled up there. I had a space of eight or ten inches, and I filled it up within six inches, and I imagine I can get more steam that way. I never notice any difference in the grates heating.

A MEMBER: Have you had any experience in burning coal with your wood?

Mr. AGUR: No, I never tried burning coal with wood.

A MEMBER: What thickness should the brick wall be under the boiler?

Mr. AGUR: I have what they call a 13-inch wall that is carried right up and over the top of the boiler. The smoke stack is about forty feet in length.

A MEMBER: Have you the check draft attached to the boiler?

Mr. AGUR: I have a brick chimney, and there is a door in the bottom of that chimney set in cast frame, and the door is about 16 by 20, and that is the way I regulate my draft. The chimney starts at the side of my boiler, and there is an elbow from the boiler across into the chimney, and I regulate my draft by this door in the bottom of the chimney.

A MEMBER: Did you ever have any experience with a smoke stack resting on the boiler?

Mr. AGUR: Yes, and I prefer the brick chimney.

A MEMBER: My experience has been the same. I built a brick chimney last spring and had an elbow put on from the boiler to the chimney and I found it a great saving of wood.

Mr. AGUR: The advantage of a brick chimney is that you can regulate your draft to anything you wish by this door in the chimney, and have your brick work tight, and you can open the door and shut the draft and the fire will go black. I do not care how dry the wood is. The fire will come back again as soon as the air strikes it.

Mr. BROWN: Cannot you get better rate of insurance by having a brick chimney?

Mr. AGUR: I think the rate mostly is 1½ per cent., and I am insured for one cent. on account of the brick chimney, and the cost of the brick chimney you can ascertain.

There are 48 bricks to the foot of my chimney. The chimney comes out from the centre or back of the partition and goes out through the roof six feet, and then I have about 14 feet of iron stack on top of that. I first calculated to build four or five feet of brick work and set my smoke stack on that; but I changed my mind, and if I was building again I would put the brick all the way up

Mr. BELL: I think it would be well if Mr. Agur would give a description of his boiler. I know several who are going to get new boilers in the spring, and there is a great deal in the description of a boiler. I was down to visit Mr. Agur twice this summer, and I found I was amply repaid for the journey. I think it would pay any cheese or butter-maker to go to Brownsville and stay a day with Mr. Agur. We got a boiler this fall on the same principle as Mr. Agur's, and the trouble was to get steam down after you had got it up.

Mr. AGUR: The space above the tubes has quite a bit to do with the boiler. I have between 16 and 18 inches from the top of the tubes to the top of my boiler. I do not know what is the cause of it, but for some reason my boiler never attempts to lift water out with the steam, and I have pumped it full. I keep about ten inches of water on my tubes all the time—ten inches over the top row of tubes—and I claim that when you get that water warm and carrying that depth of water you have that much more heat to make steam from. The dome is about 16 by 22—something about that size.

Mr. SLEIGHTHOLM: Does it not strike one that we are going to get more steam from a given amount of heat? I find that some cheesemakers whom I correspond with are very strong on this point. They say I must not cover my tubes more than two or three inches.

Mr. AGUR: My experience has been the other way. I can take and let my water to within a couple of inches from my tubes and then I find it hard to get steam. When I have eight or ten inches of water above the tubes I can put on my injector, and I find it makes little difference to the steam.

Mr. BARR: I agree with Mr. Agur on that point. I notice that every time our engineer lets the water get low in the glass he has to use more fire. I do not know how it is, but it seems to be the case that as soon as you get the water low in the boiler you cannot get the steam on, but when you get it full it will hold there.

Mr. AGUR: There is a point in carrying your water high. You want to find out where you can carry your water with safety and wherever it will do it that is the place to carry the water.

Mr. BELL: We carry the water high, and we find that we can fire better by having water high, and there is no danger of lifting the water.

Mr. AGUR: I believe in large fire places for the reason that you can get all the heat you want, and you do not require to force the fire.

Mr. GOODHAND: After hearing your address at Woodstock I changed my mind, and made it larger, and I found it did not use so much wood and I always had plenty of steam.

Mr. AGUR: My grate is practically level; just about the same at the front as at the back. For a twenty-horse boiler I recommend a three-foot grate. A great many have a four-foot grate and are burning cordwood. I do not consider that economy for there is no economy in burning cordwood. If you take that wood out and cut it through, and then throw it in, I will guarantee you will get better results. Never put cordwood straight in your boiler; it is necessary to have two rows of sticks before you get much of a fire. Throw your wood in criss-cross every way.

Mr. J. F. MILLER: Do you split your wood?

Mr. AGUR: I just use it as I get it from the parties I buy it from. I do not believe in fine wood.

Mr. PRICE: There is quite a discussion in some of the dairy papers as to the use of gasoline. Have you had any experience in that line?

Mr. AGUR: No.

Mr. MILLAR: I cannot understand how Mr. Agur can separate his milk for three cents a thousand. It costs me about eight cents. I have a boiler in the factory, and I cannot get up steam to separate milk for less than eight cents a thousand. I have thirty feet of smoke stack, and am burning green wood at present. I cannot get any dry.

Mr. AGUR: I have done that by actual test, and at the same time I have never had to put a full draft on my boiler; in fact I never had a full draft on my boiler since I started.

Mr. MILLAR: We never had it off ours, and we have just one row of brick work over our boiler.

Mr. AGUR: I have two rows of brick go over my boiler. You will find out these bricks crack, and to avoid that I took and started a row of bricks right on the edge of the boiler, and carried it up to a height level across the top of the boiler and then I covered that over with sand, and that makes it practically air tight. I have no cracks through the side of the brick wall.

Mr. MILLAR: We have a few.

Mr. AGUR: I will tell you how you can test your brick work so as to know whether it is tight. Turn on the fire, and turn the damper in your smoke stack, and see if the smoke comes out. Have a little clay or mortar on hand, and cover these cracks up.

CHEESE MAKING.

By G. G. PUBLOW, DAIRY INSTRUCTOR, KINGSTON.

I would like to see Mr. Agur take a visit through our country. A lot of makers claim they cannot make cheese because they cannot get steam up, and it struck me forcibly that making steam is like making cheese—a lot depends on the man. We would like to see any of you cheesemakers at the Kingston Dairy School any time you like to visit us. We never had a larger school than we have had this winter, and there were about twice as many makers taking the butter-making course as there have been in previous years. I would recommend each and every maker to attend some dairy school for a short time every season. We find that the best makers who come to the school always pick up something. It has been said that the limit of our cheese trade has been pretty nearly reached, and that means something of great importance to the makers of this country. It means this, that other things are taking the place of cheese, and it is your duty to make cheese so fine that a man will want another piece of it, and keep him eating as much cheese as possible. If you are in this business to stay you must do something to hold your business. That means that you have got to make your cheese so fine that a man wants another pound. How are we going to do this? It has been said that Canada leads the world in cheese, and it has also been said that they are commencing to find fault with Canadian cheese. One fault is bad flavor, but another fault is an acid cheese. These are the two principal faults, and the most serious ones we have to deal with—an acid-cut cheese and a cheese that is weak in body with a bitter flavor accompanying it. These are largely brought about by the process of manufacturing. The bad flavor we find in milk usually comes from the condition the milk was received in at the factory and in the curing of the cheese. The most faults that have been found with cheese this year in Montreal that came under my notice were bad flavor, and those having this weak and pasty texture. In some cases I believe it was caused by the makers shipping the cheese too green from the factory. They appear to be well made, but when you came to examine them at the time of selling, it was found that the flavor was bad and the texture pasty. I believe it was due to putting green cheese in too low a temperature. I find it is better to have two rooms to cure the cheese in. When you take the cheese from the press and it is about 80°, and you drop it down to 60° right off, I do not think it is good for the cheese. I would rather drop to 70° and let it set there for two or three days. I found a too sudden change is likely to make a bitter flavor.

You asked me to tell you how to make fine cheese. The first thing to ascertain is what kind of cheese you want to make. The kind of cheese we want to-day is a fine cheese that will score 100 points. We find they are very hard to get. What the trade asks from us in the eastern section is a cheese with a good, sweet, nutty flavor, that will bore close and have a silky texture. In order to have a cheese of this description we require a good factory to make it in, and a good factory to cure it in, and we require good milk to make it out of, and it also requires intelligent makers to handle the milk. The system we find that will produce a cheese of that character from good milk is to ripen the milk so that it will be fit to draw the whey from in from two and a half to three hours. You should know something about the amount of fat in the milk; three hours might be too long and two and a half just right. Every cheesemaker should have a Babcock tester to test the amount of fat in the milk. We find that we would rather treat the different richness of milk in different ways. We will consider this morning we are making cheese from three and a half per cent. fat in the milk. I would have the milk at about 84° to 86°, not above 86°. Use sufficient rennet of good flavor to coagulate the milk, so that it will show first signs of coagulation in about ten or twelve minutes, or fit for the knife in twenty-five to thirty minutes. I find the best time to cut curd is in twice and a-half the time it takes to coagulate. If the milk will thicken in ten minutes I cut it in twenty five—that is, from the time of adding rennet, or fifteen minutes from the time it thickens it. I believe in cutting the curd tender. Cut the curd first with the horizontal knife lengthwise of the vat. I would caution makers to be careful in cutting curd. Cut slowly; insert your knife so that the curd will all leave the side of your vat. Some makers leave half an inch on the outside, and have to rub that all off. Start your knife in so that it will strip right at the start. If you see a wave running ahead of your knife you are going too fast—slow up. Draw the knife perfectly level. The reason I like to cut with the horizontal knife first is that you leave the curds all lying in a flat shape. Cut across and then lengthwise; that is usually enough cutting. Some makers may cut them three times and have it fine, and others cut across. We would like the makers to all cut the curd the same size. If you want a uniform cheese do not lap the knife; if possible, try and cut each piece of curd exactly the same size. Do not turn the knife around and cut twice, every time you turn take the knife out.

Stir the curd gently immediately after cutting. If you have only one vat in the factory you can do it with the agitator perhaps better than you can with the hand. I find makers do damage very often in hand-stirring the curd; they hold their hands tight and draw the curd into balls. Keep the curd in the shape you cut it. You can do just as well if you are careful with the agitator, but if you have a helper I would prefer going round the vat two or three times. If there are any pieces you happen to miss, just nip them in two again. Do not put the agitator in and run the curd up to the end of the vat. Stir gently. When you come within six inches of the end of the vat, lift your agitator out and shove it down at the end. Do not shove your curd up until it gets firm. I believe in stirring the curd for a considerable time before applying the steam, especially if there is any indication of gas in the milk. I stir some curds for an hour from the time I get them before I apply the steam. Watch your curd at that stage and see how it is formed; but have it formed up until you know the lactic acid is coming well. You will know by the flavor.

Cook the curd slowly; two degrees in five minutes is fast enough—a little too fast at the start. Cook to 96°, and keep stirring the curd for fifteen to twenty minutes. Then try the curd on the hot iron and see if you get any acid. I do not like the acid developed sooner than in two hours. If you see the acid is going to come before that raise the temperature to 98° and remove some of the whey and keep on stirring the curd. Aim to get the curd so formed before you get acid enough that when you squeeze a handful it will fall apart. There is more cheese spoiled in that stage than any other stage of manufacture in our section. I understand you make nearly all fine cheese in Listowel section. We do not do that in the Brockville section. Makers do not set the milk soon enough, and do not have the curd sufficiently cooked when the acid develops. Have the curd, before you get acid in, hard and shotty, but firm, so that they will almost come together but fall apart; keep that nice silkiness of body. I cannot get a sweet

nutty flavor in the cheese if I let too much acid develop in the curd when soft, neither can I get a silky texture. We have destroyed it by letting the lactic acid develop too far when the curd is soft. If you go to work stirring it out to keep the cheese from being acid-cut you break the texture. If the curd was well cooked you have not to do much stirring when you take off the whey. When I am speaking about acid I mean after the whey is removed from the curd. I like to have the whey removed from the curd when I have got one-eighth of an inch on ordinary curd. Always try your curd after you have stirred it over once or twice on the racks or on the tin, and see how much acid you have got. If you are a little shy, and the curd is a little sweet, do not stir it quite so much. If it is developing too fast stir a little dryer; retain moisture enough at that stage so that the acid will develop right along freely. If you have got too much moisture it will develop too fast and break your texture, if it is a little too dry you did not get enough acid. It will become cracked, and perhaps develop into acid holes. I like to draw with one-eighth of an inch, the curd fairly dry. Turn the curd once over after it has been cut say fifteen minutes, or enough that it will cut and turn over free. Turn the curd once after cutting in pieces about eight inches; then put the curd two deep. You can either do it by putting the pieces lengthwise or splitting them again half the length of the vat. Watch how your curd kneads after you have piled two deep, and turn over a couple of times. I would not tear apart the first time. If the acid is developing freely, and no signs of pin holes are developing, I would not do much more piling than that; but if the curd is a little soft and the acid developing slowly I would put it up once more—that would be four piles high. Let them get together and split them again, that gives you more weight. Keep the curd turned over till you get about one and a half inches of acid—a nice pull on the iron. I may say here that this pull of the iron is not, perhaps, a very good guide. At the School one man will have it draw out an inch and a-quarter and another man an inch. First when you match the curd it is raw, then flaky and fibry. I find the best time to cut the curd is when the fibre starts. If the curd is set in three hours I generally have that condition in about two hours, providing I have kept the temperature up, so I like to mill at that stage.

In milling the curd I like to use a mill that will cut every piece of curd the same size. Immediately after, stir this curd up. Do not let it lie in your curd mill and get matted together, but first keep it shook over the vat. Watch the curd till it just starts to heal over nicely; then you can start to put it up a little bit. If the curd is a little raw at this stage I would not stir too much. If it is a little bit sloppy, or feels tender, stir finer and do not pile so much in the vat. Air the curd just as long as the flavor is getting better. Wait then, perhaps an hour, when the curd is well shrunk up and has a fine matty texture and good flavor. When you squeeze it up do not squeeze it too hard at first. Have the curd in such condition that when you squeeze it up in your hand it is going to stay there. Salt the curd about two and one-half pounds to 1,000 pounds of milk. Use the best dairy salt you can get, of rather coarse grain, and take lots of time in putting on the salt. I prefer scattering it on with a sieve, and putting it on about four times; I find this is much better than putting it on twice. I do not think the second salting should go on till you cannot feel any of the first. Keep all these particles of curd the same size at the time of salting, so that they will get the salt even. Put it on slowly so that it will get well into the cheese. If you salt it too rapidly, or put on too much, you know the salt is absorbed in the curd. You may have open cheese from putting on the salt in a wrong way.

After the curd has become mellow, and the temperature reduced as near eighty degrees as possible, put it in the hoops. Be sure that you have got smooth, soft press cloths. Weigh the curd so that you put the same amount in each hoop, and in hooping the curd pack it well in the centre, and leave the curd raised a little in the centre when you put on the follower. Press gradually and constantly for from three-quarters of an hour to long enough so that your curd or cheese has become the proper shape; then it will be quite safe to take them out and bandage them. In putting on the bandage have the seam straight; if you have it a little crooked it will go crooked on the shelf. Leave about an inch or an inch and a quarter to dress your cheese, and dress them neatly. In putting them back in the hoop do not press too hard; if your followers are not quite tight

and you press them too hard you will be apt to have collars up on the cheese, and standing collars are not fashionable on cheese. I think makers as a rule put on too much pressure. If the curds are in right shape it does not require so much pressure to make them close. It is always safe and advisable to take your cheese out of hoops in the morning. If they have collars, lift up your hoop cloth and bandage and trim off these collars and let your bandage down. Wet with hot water so that your bandage will cleave again. Do not put the cheese on the shelf while you can find any fault with it yourself. I do not think there is any excuse for not having a good finish. Press them two days if you can in hot weather; but if you have attended to the pressing well twenty or twenty-four hours will be sufficient. Some of our factories are pressing two days in hot weather, and they appear to have a little better results, as the cheese seem to keep their shape better. When taking them from the press put them on the shelf in rotation. Put a little mark on your cheese, if you do not date them, so that you will know what cheese belongs to each day's making.

Try and keep your curing room as near 65° as possible. As I told you before, have two rooms, if possible, and take a cheese from the press, and put it into a temperature of 70° for a week or three days, and then put it into a room of a temperature of 60°. You will be surprised when you come to bore them. We have done some work along that line, and there was a difference of a quarter of a cent per pound in the value of the cheese.

These rules will make good cheese from good milk, but you require to do every part of the work well, and I would say to every maker: Do your work as well as you know how. Find no fault with the milk while you are able to find fault with yourself. (Applause.)

Mr. Bell: Have you found ragged holes in cheese from curd pressed in at the sides and not the centre?

Mr. Publow: I might say I have watched them closely, and especially since I have been instructor at the Dairy School. We have two presses, an upright press and a gang press. I have watched the makers, and I noticed some cheese were a little open, and I could not very well account for it. I knew the curd had been kept fine when salted, so I took pains to watch the men who were in charge of the vats, how they hooped the curd, and I found invariably they packed it on the outside, so I had two cheese made, one packed on the outside and the other in the centre, and invariably we found the cheese that were left loose in the centre a little open.

Mr. Bell: You spoke about heating the curd to 90°, and Mr. Dillon last night spoke of heating up to 96° and cutting it a little finer. Do you prefer cutting a little finer and heating to 96°, or would you cut the curds a good size and keep up the temperature?

Mr. Publow: There is quite a lot to be said on that subject. If we are going to cut finer we must have finer knives, and I believe be should have finer knives. That matter has to be controlled by the fat in the milk. We are asked to make a silkier cheese than we formerly did. Of course the finer you cut the curd, and the higher you cook it, the more moisture you expel. If we build up the cheese with moisture we certainly must cure them low, or we are going to have trouble with the flavor. I like to cook to 96°. The secret of the cheese business is to control the fermentation, and the lactic acid is the favorable one. If we cook higher than 96° we are liable to get out a little too much moisture, and if the milk has been gassy or tainted with germs they may develop, and if they develop at that stage you may have trouble. Our object and aim should be to encourage the right fermentation. That is why I would cook to 96°. I would not go higher until I was sure that the right fermentation was in advance, and that is the reason why I advise you to stir a gassy curd anywhere from three-quarters of an hour to an hour. I think it is the best time to handle a gassy curd after you have got the milk in the vat. If you have rich milk say 4 per cent.—some of the section I go through in the month of September is 5 per cent.—96° or 98° is not high enough to make fine cheese. In that section I have had to go 102° or 104°, but in these factories the knives cut the curd coarse. The oftener we cut the curd the more loss we have. I believe the factories would be benefitted by having two sets of knives—coarse knives for spring and fine knives for the fall.

Mr. Bell: Cutting the curd finer you lose more fat?

Mr. Publow: We find that the loss of fat is not so much in the cutting. The most serious loss is in handling the curd afterward.

Mr. Bell: Could the moisture not be retained from the coarse curds?

Mr. Publow: You might; if you raise the temperature you don't have quite as good a yield.

Mr. Bell: Do you advise the makers to shake the salt with a sieve instead of putting it on with the hand?

Mr. Publow: Yes; I prefer the sieve. It will guard against fine lumps of salt getting into the cheese. Use a hair sieve.

Mr. Morrison: What distance apart would you prefer to have the blades in the fine knife?

Mr. Publow: I would not like to have them over three-eighths of an inch.

Mr. Morrison: You would not always cut in twice and a half times; you would not make that a set rule?

Mr. Publow: No; I would not make it a set rule. I would say I have never found it vary unless I made a mistake myself.

Mr. Bothwell: How would you determine the gas? We often find we get gassy curd from nice flavored milk, and if detected the gas holes will develop. How would you determine it in the milk?

Mr. Publow: That is a very hard matter to do. Sometimes the trouble may arise from the morning's milk. But these pin-holes that develop are certainly due to filthy organisms; there is no doubt about that. We used to guess at some things, but there are some things that we are certain about, and I believe these pin-holes come from filth. If they are in the morning's milk they may not have developed far enough so that you can detect them by smell. You can usually tell by the way your curds work whether you are going to have gas or not. If you are having trouble with gassy curds, and you cannot detect it in the milk, the only way is to take a sample of every man's milk. Take an ordinary composite bottle, and half fill it, and put it into warm water so that the milk will be up to 100° or 102°. Put a little rennet in—two drams of rennet and two ounces of water. Let the composite sit there in the warm water, and take a knife and cut the curd. Always dip the knife into the hot water so that you will not carry any germs from one to another. If there is any milk causing you trouble you will get the same trouble in these bottles, but it will be in a more marked degree than it would be in the vat. If you have pin-holes you will have it right in these curds. If it is bad flavored without pin-holes, you will have it there, and in that way you can detect gassy milk on the stand. You will find it out in that way. You may also cause those pin-holes to develop in the way you cut the curd. I find in every factory I visit the biggest trouble is in that source, and what do you do if you have curd the size of wheat, the size of corn and the size of plums? It is a process of fermentation. How much more moisture do you get out of these pieces cut the size of wheat, and those cut the size of corn? What effect has that on the working of this curd? We have imperfect milk to start with; it has got more or less filth in it, and if the curd is gassy, and you cut them fine, you are going to have trouble. If you are having trouble with little pin-holes developing in parts of the curd, see that you have the curd all cut the same size

Mr. Bothwell: At what rennet test would you set the milk?

Mr. Publow: I would not make much difference in the rennet test—perhaps two seconds.

Mr. Bothwell: Provided it was good milk, would there be gas holes through it caused by handling?

Mr. Publow: If there were no filth germs there would not be; there is nothing that will cause pin-holes except these filth germs. We have had them analyzed, and we found these same germs. We have a starter down there that we can make pin-holes

from any day, and that starter is as sour as vinegar. We had Dr. Connell make some pure culture. We pasteurized the milk to start with. The morning I went to use it I was a little bit surprised at the smell; to me it smelt like decayed roots; it was as sour as anything you ever tasted. I sent for the doctor to come over and see it, and he found he had been making some experiments from gassy curds, and he had got some of these germs out of the wrong bottle into the lactic acid, and the lactic acid germs would not destroy them at that stage.

Mr. Bothwell: According to that, lactic acid would not destroy gas?

Mr. Publow: No; it would not in that way. If you put in a bad starter it will certainly get worse instead of better.

A Member: Have you ever had any experience in washing curd after milling?

Mr. Publow: Yes, I have; and I have had good results. In some instances it is a good thing to do If your curd is sour it will help a gassy curd, and it will help a bad flavored curd if you have good water; but if you have not good water it is simply adding insult to injury. I find good results for bad flavor by putting water on immediately after taking off the whey. I think the best time to wash the curd is after milling; but if it is a very bad flavor you want to be sure you have plenty of acid on at the time. The way I wash whey is when I mill. I scatter the curd well over the vat, and have the water at 108° or 109° so as to bring the curd up to 100°. I stir in the water for about one-half hour, and then drain off the whey just the same as you would the ordinary curd in the first place, and stir the curd well. I have left them in one and one-half hours after the water was taken off; and the curd being sour in the first place you could not tell it had been made from sour milk. We have four cheese at the School to-day made from sour milk that were ready to set in four seconds after the rennet test. We had a good man examine these cheese and he could not tell they were sour. I do not say they were fine, but I believe they were fine enough for a buyer to pass them. When you come to test them you find perhaps a little of this sourness, but I have seen cheese made from good milk no better.

Mr. Morrison: In washing curd after milling how much water do you use?

Mr. Publow: About a barrel full, just enough to cover the curd over; putting it on with pails.

Mr. Agur: What is the cause of curd lying four or five hours between milling and salting?

Mr. Publow: It is usually due to not giving enough acid at the time you remove, or taking out too much moisture; or it might be caused by letting the temperature down. It is caused by the wrong fermentation working against the right fermentation. You have made a mistake by taking out too much moisture or not giving enough acid.

A Member: What is the cause of curds taking from twenty to fifty minutes to thicken up?

Mr. Publow: I do not know that I can tell you the cause. We generally find it does that when the rennet has been a little weak and has not acted upon it. It may be due to the alkali in the milk; but usually when we find it works that way I am suspicious of the rennet.

A Member: I have been using Hansen's rennet, and I had some that was used in a neighboring factory, and it would thicken up the milk in twenty minutes, but in our factory it took forty minutes. This summer I hardly ever got the curd in less than forty minutes.

Mr. Publow: I would have used more rennet, or raised the temperature higher in setting.

A Member: I was using three ounces of rennet, and raised the temperature as high as 86°.

Mr. Publow: If I was sure the rennet was strong I would have the milk analyzed. It might be due to alkali.

A MEMBER: How would you treat a "floater?"

Mr. PUBLOW: I have made cheese twenty-six years, and I never had a floater. We had one in the Kingston Dairy School. The best way to treat it is on the weigh stand. You can always detect milk on the weigh stand that will make a floater, if you make your fermentation test. I have seen them float in twenty minutes. If they float on you, you will have to give them a little more acid. I would not stir them; keep the moisture there. The curd has become too light when it floats.

The PRESIDENT: Would you raise the temperature before dipping?

Mr. PUBLOW: Yes, keep the temperature up for a while till you get your acid developed well. I have seen some very good cheese made from floaters.

Mr. STEWART: How do you determine the benefit from this stirring; have you watched so that you know it has been a means of getting rid of the gas?

Mr. PUBLOW: The best place to determine it is when you are getting in your milk. The maker should be on the weigh stand himself. You will notice when you are getting in gassy milk, and this is a good guide to go by. In handling the curd, if you did not know that you could tell by the smell.

Mr. STEWART: Have you taken milk and treated it by stirring an hour or an hour and a half, and made it up in the ordinary way; and taken the same milk and stirred half an hour or an hour, and have you been rid of the gas?

Mr. PUBLOW: Yes. I have determined it by the feel of the curd and the smell of it. We do that work at the Dairy School, and I think it is one of the great benefits the School will be to cheese-makers. We weigh new milk into one vat and then take and weigh equal parts and put it into three vats, and take the same milk exactly and treat it in three different ways.

Mr. STEWART: You think as a matter of fact that this is the means of getting rid of gas?

Mr. PUBLOW: Yes, we know the lactic acid treatment overcomes it. The lactic acid comes from the sugar in the milk, and if you take away the sugar you have nothing to produce it.

Mr. CLARK: Cannot you make just as good curds by washing them?

Mr. PUBLOW: It is a lot of work to wash the curds, and there is danger in doing it unless you have good water. It may be necessary to wash them after handling them in that way, although I would not advise washing them if you can get on without it. But if you have taints on the curd, and they are gassy, it would improve them to wash them.

LESSONS FROM JUDGING CHEESE.

By I. W. STEINHOFF, STRATFORD.

With the samples of cheese and butter we have before us this should be one of the most educative conventions that has been held. I may be able to bring out some of the characteristics of these cheese that we had at Guelph a little plainer than Prof. Dean took time to make them. I would like very much to see some of these cheese here. I never saw as good an illustration of the benefits of a proper curing temperature as I did in these cheese at Guelph. The curd was made in exactly the same way, divided in three parts, one kept in room from 60° to 65°, the other 65° to 70°, and the other 70° to 75°. Mr. Bell, Mr. Brill and myself scored the cheese at different dates. I was the last one who scored, and consequently you would expect in my scoring a wider range. I scored one of these cheese made from curds in July as high as 96 and 94 and 95 points. They had good body and texture, and were somewhat similar to our September cheese, showing that the characteristics we find so frequently in summer cheese is largely caused by curing.

The cheese curd in a high temperature we scored down as low as 73 points. In these last cheese we found that mealy characteristic that we find in the cheese cured in the worst curing-rooms that we have in the country. The flavor was completely gone, while in the others it was fairly good.

I would say for these coming years we should improve in four particular points. The first one is in the milk itself, and I do not think milk takes many flavors after it comes to the factory. Consequently I think we must have better milk, and for that purpose we must look to the farmers to produce it. Then we want better paid cheesemakers. It is not so long since I left cheese-making myself, and a few years ago cheese-makers were paid better than they are to-day. It is unreasonable to expect a man to do his best when he is working for wages that will not allow him to hire sufficient assistance. Then he must deal with patrons who come occasionally to the factory, and he should be in a proper mood to receive them ; and a man cannot do that if he is tired every night when he goes to bed. If a man is feeling his best he is more cheerful. A lot of cleaning has to be done at the factory at night after you are through with the ordinary work, and if a man is tired he will not look around the corners as well as he should. Then I think we should have better exteriors to our cheese. I have had a number of complaints of rough exterior. Sometimes they are mouldy or cracked, and the dirt gets into the cracks, and I think that the maker should try and do his utmost to have fine finished goods. The poor exteriors are much more apparent now, because there are a lot of makers making finely finished cheese. This is one of the great things we must accomplish—a better method of curing. We often find a little stove set in one corner of the curing-room, and the cheese in the other end of the room are cold. We must have improvement in this respect, and in summer time the temperature should be controlled. It is an absolute necessity to control the temperature of the curing-room. I never had it so forcibly placed before me as I had it in judging these cheese in Guelph. I am certain that we can save a great deal of this rough, nasty texture by controlling the temperature of the curing room, and I think every maker should make a special effort to do this.

WINTER BUTTERMAKING.

By John F. Millar, Brantford.

Separating Milk.—In order to get the best results in separating milk it should be done just as soon as the milk is drawn from the udder, before it gets cold. However, we find this cannot be done when operating the creamery, so we must do the next best thing. When the milk arrives at the factory it may be weighed and the amount credited to the one who sent it. Milk which is not sweet and clean should not be taken into the factory, as this will only spoil the good milk to a certain extent.

The butter-maker will find it more difficult to detect flavors in the milk in the winter season as the temperature is generally so low. A good way to detect a flavor is to take a sample, cork it in a pint jar, put the bottle in a pail of water and heat the water up to a temperature of 125° F. Then draw cork, and you will be able to get any bad odor.

All milk should be pasteurized unless it is all a good flavor. By pasteurizing the whole milk it kills all bad germs in cream and skim milk, making the skim milk of much more value to anyone feeding calves. It also gives a uniform flavor in butter. After milk has been run into the receiving vat the steam should be turned on gradually, bringing temperature up to 70°, and should be held at this heat a few minutes before running through separator. If not pasteurizing the milk it must be heated up to 100° for winter and 85° to 90 in summer.

Separating.—When milk starts to arrive at factory the separator may be started. After oiling all parts, and bowl should be filled with warm milk or water. Increase speed gradually at first, taking from 10 to 15 minutes for large machines. When speed is up to the proper number of revolutions, start milk into separator, slowly at first. The speed of the separator should never slacken during the run unless forced to do so. Keep

the separator well oiled, but do not have the oil running in streams down the floor, as this is simply waste. Keep the separator perfectly clean. After washing set bevel under steam pipe and steam the inside for a few minutes. Catch a sample of skim-milk every day and have it tested. Any separator leaving more 1% in skim milk should not be used, as you will soon lose enough to buy a new separator. In order to get a fair sample of skim milk have a little hole made in skim milk pipe, where a drop will come out about every minute; there you may set a jar and get a fair sample. Run speed of separator about 500 revolutions more than the number which is marked on the bowl; we find we can do better skimming by so doing. Do not let milk be dropping or spilling around the floor; see that all pipes and joints and taps are perfectly tight and have everything in good shape. The cream should contain from 30 to 34% fat. Put about 10 or 12% of good starter into it, which will reduce it to 28 or 32%. This I have found to give good results when churning. The starter may be added as soon as cream starts into the vat.

Ripening the Cream.—Ripen cream at a temperature from 70° to 75°, or have the cream started to thicken in six hours from the time it has been separated. Quick souring will improve the flavor of butter. As soon as cream is thick it should be cooled down quickly to a temperature of 60°, say in one hour's time, and then gradually down to 50° or 52°, and should remain at that temperature for three or four hours before churning, in order to harden the globules of fat properly. Cream should be thick ten or twelve hours before it is churned. During the ripening process it should be well stirred occasionally to ensure even souring; the cream vat should also have a cover to help keep heat even and keep any taint out.

Churning.—Scald the churn thoroughly; have water not less than 180°. Revolve the churn five minutes, and then draw water and cool the churn by adding cold water. Always stir the cream well in the vat just before removing it into the churn, and when at all possible run it in by gravitation; cream of course should be strained into churn. For export butter color will hardly be required. The temperature for churning will depend on richness of cream. Have cream rich enough to churn at 50° to 54° F; time of churning varying from 50 minutes to 1 hour.

When the butter is about to break, the churn should be stopped and the temperature taken. If the cream has warmed up a little, put a pailful of cold water into churn, but if it is cool enough do not use water too cold, but in all cases water should be used at this stage, as it will aid in getting a better separation. A loss of butter fat is often due to cream being too warm at this stage, and temperature not being lowered. Churn until granules are as large as grains of wheat; then stop the churn. After allowing it to stand five minutes draw off the buttermilk, and then wash with plenty of pure water. The temperature of the water for washing butter may be about 2° lower than butter. If the butter is in good condition once washing will be enough; otherwise wash twice, or until the water runs off perfectly clear. A little salt may be added to the washing water. This will give the butter a bright color, and help the separation. Keep temperature of butter room about 55°. When butter has been properly washed it should be allowed to stand for 30 minutes at least before working. The amount of salt used will be gauged entirely by the requirements of the market. Where butter is made in a trunk churn and worked on a separate worker, the butter will be weighed before salting and salted accordingly. But when salted in churn, or combined butter churn and worker, the weight of salt may be calculated from weight of milk. Salting should be uniformly done, especially for export trade. When salting butter in churn $\frac{1}{8}$ oz. more should be used per lb. butter than salting on table.

Working.—When butter is worked once, working should be carefully done. All little particles should be incorporated into the mass, and not left lying around the table. When butter is worked by number of revolutions of worker be careful not to overwork it. You may find out the proper number of turns to give worker by careful examination of butter forty-eight hours after it has been worked. If it has been over-worked it will be greasy, and show injured grain; if not worked enough it will be streaked. If butter is made for export nothing but a first-class package should be used. It should be lined

with parchment paper; a little salt may be put in bottom of box. After the paper has been brought over the top of butter a little more salt may be sprinkled on, the cover of package should rest tightly on this. Butter should be tightly packed, and the package should be air tight. Keep them clean by using canvas sacks, which will aid in selling the butter. Give the creamery business your most careful attention. Keep everything scrupulously clean and success will surely follow.

Mr. SLEIGHTHOLME: What sort of sack would you recomend?

Mr. MILLAR: Just a common sack; we have been getting them from Mr. Ballantyne.

Mr. SLEIGHTHOLM: Do not they smell bad?

Mr. MILLAR: They do not smell perfectly sweet, but I do not know that there would be any danger of tainting the butter. I do not think there would if the butter was tight in the box. I have heard it said that the butter sent to the Old Country, where these sacks were used, was worth two shillings a cwt. more than where they went without sacks. In handling, the boxes get dirty, and although the butter may be all of good quality the appearance is against it.

A MEMBER: How much starter do you use in your cream?

Mr. MILLAR: 10 to 12 per cent. It is pretty hard to get the cream sour in a short time unless we use plenty of starter. Our cream starts to thicken about six hours from the time we are through separating, and we ripen at a temperature of about 70°.

A MEMBER: We have practised ripening cream at different temperatures with different per cent. of starter. We find that 10 per cent of starter with cream at 70° will ripen that cream just as fast as if we put 20 per cent. of starter at 60° to 65°; you get just the same results.

Mr. A. SMITH: Have you had any experience in using pure culture in starter?

Mr. MILLAR: No, I never used it. I use just the skim milk and pasteurize it.

Mr. SMITH: What per cent. of fat do you have in your cream?

Mr. MILLAR: I prefer to have about 30 per cent. I have found best results from making butter by having it 30 per cent. When your cream tests above that I have found greater loss in the butter. If you run your cream 33 to 34 or 35 per cent. you have to use a certain amount of water or the cream will thicken up. I had a churning not long ago where the cream tested 33 per cent, and in that churning I had to use 100 pounds of water, and the butter seemed to be a kind of gassy, and there was a certain amount of loss of butter because when the cream starts to drop from the churn about every five minutes there would be part of it still sticking to the churn. When we have the cream 30 per cent. we can get along without adding water, or very little.

A MEMBER: Do you prefer dry salt on top of the box to brine.

Mr. MILLAR: Yes, I prefer dry salt. I think a little dry salt sprinkled on top of the butter is all right; I do not like to use the brine. Of course there is no doubt it keeps it perfectly air tight.

A MEMBER: Does the butter not dry out with dry salt and get mouldy?

Mr. MILLAR: I have never heard any complaint; we soak our fibre paper in brine.

Mr. A. SMITH: After finishing your butter and packing in boxes, do you put it right into cold storage or let it stay in the making-room?

Mr. MILLAR: I usually put it into a cool room, at a temperature generally about 30°.

A MEMBER: Do not you find you have to give your butter more working in order to guard against mouldy butter?

Mr. MILLAR: Yes, we do.

A MEMBER: Do you ever find your butter too high color?

Mr. MILLAR: No; we have never found it that way. We do not make any in summer time. At the present time we are using one-eighth of an ounce of color to 1,000 pounds of milk.

Mr. A. Smith: Have you found it a good practise to let your butter stay in the making-room four or five hours after making? If you put it in a really cool room, and the butter is not worked sufficiently you are apt to have it cloudy or mouldy.

Mr. Rogers: This is a piece of information I am very glad to hear. Mottles in butter is a very bad thing—something I have not experimented with—and I am glad to get this piece of information from Mr. Smith. With regard to the loss of fat in buttermilk, I have found a good deal depends on how you finish up the churning. I have found some of the heavy loss from rich cream, and it is due to there being so much butter and so little buttermilk that when the butter breaks it comes together so quickly, and you look in the churn and think it is done churning, whereas there is a lot of cream around the sides of the churn that is not being churned, and when the butter begins to break that washes down and passes out with the buttermilk. I find a good plan is to use plenty of water at the finishing up of the churning. It is necessary to watch closely so that you add the water at the proper time. With regard to the proper per cent. of starter used from the weight of milk, we usually run from 15 to 20 pounds of starter for 1,000 pounds of milk separated. When you want to use 10 per cent. in the cream, that is about 12½ pounds to 1,000 pounds of milk. When you want to use 20 per cent., that runs about 25 pounds of starter to 1,000 pounds of milk separated. If you have a good starter it is a very valuable thing, and if you have a bad starter it will do a lot of damage; it will help to ripen the cream but it will not help to improve the flavor. We have a starter at the Guelph Dairy School that is about five months old, and when the School opened I asked Prof. Dean to send off for some of Hansen's Lactic Ferment to have on hand in case our starter went wrong. It seemed to go off in flavor just when the School opened. Before I made a new starter I sent samples of the old starter to Prof. Harrison to make an examination of it, and he reported it a very pure starter, and was surprised to find it was four months old at the time he tried it. There are a lot of starters used that are no good. I like the starter that looks perfectly smooth when you look at it in the morning, no whey or curd on top, and I like an acid smell. If you have a starter like that take care of it, and I would advise you to pasteurize the skim-milk and be particular in every point to handle that starter and keep it clean. If you get a good starter I do not know how long it could be propagated and still keep good. Ours is five months old, and I would not trade it for the risk of trying pure culture or any other kind, because what we have is all right.

Mr. Smith: With regard to the use of pure culture for starting, we purchased a number of packages of pure culture, and I experimented with it in three different counties, and in each and every case we had excellent results, and I would recommend the use of them to any one.

Mr. T. C. Rogers: I am quite in favor of the use of pure culture for winter buttermaking. It is difficult to get a starter. We have been experimenting at the Dairy School at Guelph, and I have taken six glass sealers, similar to what they use for preserving fruit in, and have put six different kinds of milk. Milk that was pasteurized and milk that was heated up to 110°, and samples of milk from our home dairy and from our different patrons, and set them side by side on the table, all at the same temperature. You talk about gas. There was one all full of pin holes, and all the curd floated to the top and the whey at the bottom. We had others with whey on the top and with a solid curd from top to bottom, and we had others with the whey on the top. There were all manner of flavors. There was only one I would risk making a starter out of. It was from the pasteurized milk.

A Member: Why did Mr. Millar let his butter stand for five minutes after he churned it?

Mr. Millar: I think by so doing you get more butter. I think there are some fine particles of butter that will rise. If you draw right straight off the chances are you will lose some of it.

A Member: You are apt to have a bitter milk flavor on your butter.

Mr. MILLAR: No; I do not think so, if you wash it with good pure water. We wash our butter only once, and we have the water running off perfectly clear.

A MEMBER: Do you wash at 48°?

Mr. MILLAR: I do not have the butter come out of the churn at all times at 50°. It generally comes out 52° and 53°. The box of butter I have here came out the churn at 50°, and I washed the butter at a temperature of 52°. On that butter the cream was thick and I had to put it in a lot of water, and I believe it hurt the grain of the butter, as it seemed to be a little greasy. I salted the butter in the churn, and gave it five turns on the table, and left it stand four hours. I know the grain was not hurt by working.

A MEMBER: How long do you run your churn to wash the butter?

Mr. MILLAR: We give it about eight or ten turns, running it pretty fast. Before putting on the washing water we generally let the buttermilk drain off; then we throw on four or five pails of water, and let that drain off, then we put on our body of water. I put a little salt in the washing water.

A MEMBER: Do you add any water before letting the buttermilk run off?

Mr. MILLAR: I would prefer not to do it. Sometimes we have to do it when we have thick cream. If you have your cream about 30 per cent. I find it will come to a certain stage before it starts to break.

A MEMBER: Would you add the water as soon as you detect the butter breaking?

Mr. MILLAR: Not necessarily; I like to see it just starting to clear a little. I do not like to add it too soon.

A MEMBER: That is to effect a clear separation before the churning is completed?

Mr. MILLAR: Yes; just when it is starting to clear—just between the drop and the splash.

A MEMBER: Do you ever use a brine?

Mr. MILLAR: No, I never do.

Mr. T. C. ROGERS: Pasteurizing means the application of heat to any kind of fluid for the purpose of driving off bad odors and destroying the life of organisms that produce fermentation. This discovery was made by Pasteur, a celebrated French scientist, in 1850. Between that and 1860 he discovered that fermentation was due to the action of a life organism in the fluid. In 1868 he began to apply the system of pasteurizing to the wine and beer trade of France to prevent fermentation in the wine and beer that was causing such serious loss. Nothing was known about his good effect in the art of butter-making until about the year 1890, when it was introduced by Stork, of Denmark. Pasteur knew nothing about pure culture. Stork found that in butter-making it was necessary to follow it up by the use of pure cultures. You know how the Danes have succeeded. About 90 per cent. of their creameries are adopting the system of pasteurizing, so as to make uniform quality of butter.

Mr. BELL: Would it be policy to pasteurize in the gathering cream factory in the summer time?

Mr. MILLAR: Not in the summer time, but in the late fall when the cream can be delivered sweet; you cannot pasteurize sour cream; you will spoil the grain of your butter and do a lot of mischief.

ICE BOX FOR CURING-ROOM.

By A. T. BELL, TAVISTOCK.

The ice box is made as follows: First have a galvanized pen three feet square, edges turned up about two inches, a hole in the centre with a nipple attached to convey the water to the floor. Fasten a return elbow to lower end of nipple, which will hold the water to prevent any air coming up in to the room. Place on this

pan a rack two feet ten inches square, made by using four bed pieces two by four inches cross-wise and on top of these place enough of pieces two by three inches on edge, two inches apart, to fill up space. Place on this rack a tight pine box two feet ten inches square, six or six and a half feet high, with corner strips to strengthen, and a short iron pin in each corner to keep box from shifting on the rack. Have a door 24 inches square on one side as high up on the box as will be convenient for putting in ice. To get the best results keep the box pretty well filled with ice.

We find since we got that box that there was a circulation of air, and we found that 2½ feet from the bottom we could feel the cold air coming out. We placed the thermometer about a foot away from the bottom and it registered 52° although the temperature in the air registered 58°. I was very well pleased with it, because I have seen other ice boxes, and I think this is the best. I placed a hygrometer close to the ice box and it went up 20 points, and that convinced me that the ice box had the effect of drying the air as well as cooling it. Of course a sub-earth duct is a good thing but it causes a dampness, and I am satisfied the ice box is best. I had the pleasure of seeing these cheese at Guelph Mr. Steinhoff has been talking about, and I would not believe they were made from the same curd. I believe it is possible to have good cheese all the year round if we cure them properly. Regarding the cost of this ice box I have not yet received the bill, but the tinsmith's bill was $1.50, and the wood work should not cost more than $5 or $6.

A MEMBER: You say the hot air comes in at the top and goes out at the bottom.

Mr. BELL: Yes, you could feel the strong current I leave the top of the box open.

A MEMBER: Do you have to have a ventilator in the curing room?

Mr. BELL: No; it creates a draught. I set it in thecentre of the room right on the floor.

A MEMBER: Would not you recommend that box should go a little higher up, and the door should be bigger, so that a man could fill the ice in?

Mr. BELL: This seems to work so well, I do not know whether to recommend anything different or not.

A MEMBER: Don't you think it would be better to have more space for the purpose of putting the ice in?

Mr. BELL: If you cut up the side it weakens the box.

A MEMBER. How much did you cool your curing room down by the use of this ice?

Mr. BELL: Our curing room had been standing at a temperature of 78° for some time. I had to buy ice and could not get much, and I could not reduce the temperature very much; but we held it there and I am satisfied we could lower it if we put the ice box in in time. The current was coming from the box at a temperature of 52°. I found it worked better if you got the box full of ice; what we put in lasted two days.

A MEMBER: Would it not be better to fill it entirely from the top with a pulley?

Mr. BELL: Yes; I think it would be the best plan.

Mr. BALLANTYNE: I would like to add a word on the importance of curing cheese, and of keeping it from getting sweaty in the summer time It is becoming a great difficulty to get the English, people who live on the other side of the Atlantic, to put up with defects of any kind; and when we receive cheese in a sweaty condition they arrive in England in a very bad condition, and our customers complain. During the last few years we have had to make good some losses on that account. I know for ourselves, and from what I have heard other buyers say, that they will be more particular on that score than they have ever been in the past. This is from the buyers' end of it. From the cheese makers' and from the Patrons' end of it, it is important, as the shrinkage is enough to make it more than worth while to have a proper curing-room. I think one of these ice boxes would be sufficient in a curing-room, provided the temperature was not allowed to get up. After the temperature has got too high it is a difficult matter to reduce it. But if you get the ice in early enough you can keep the temperature at a proper point.

HANDLING GASSY CURDS.

By George McDonald, Bluevale.

As this subject covers so much ground, I will not attempt to describe the many ways of handling gassy curds under all conditions and in different factories. I can only speak of the way I handle gassy curds in my own factory.

The first place I have to deal with gassy milk is at the weigh can. There is the place to handle gassy milk, if we can tell it is gassy. The way I would handle this is to send it home again, and also send a note home with the milk telling what is the matter with it, and that you will call around in the evening to try and help them find where the trouble is, and give them some instructions about caring for the milk. I think if there was more of this kind of work done we would have less gassy curds to handle, and better cheese.

Now, having the milk weighed into the milk vat, the next thing to do is to heat it up to 86°, and then try the milk with the rennet test. As a rule, if milk is gassy it will not develop acid as quickly as milk that is not gassy; so when I have a vat that is developing acid very slowly I begin to think it is gassy. The first thing I would do in such a case is to raise the temperature of the milk up two or three degrees. This will help the acid to develop faster. Before setting a gassy vat of milk I would ripen it down two or three seconds lower. This will give the acid a good start. I do this so that my curd will not lie too long in the whey waiting for acid to develop. If it lies too long it will get dry and hard and have a slow working curd. When I ripen the milk lower I will have a faster working curd, and so I will work my curd accordingly. In setting I would use a little more rennet. This will give more time for cooking the curd, and will make the curd firmer for cutting. In cutting I would cut so as to leave the cubes large, so as to retain more moisture and help the acid to develop.

In cooking a gassy curd I would stir for 15 minutes before turning on any steam, and cook slowly up to 98°. Then stir well to keep all particles of curd apart, and get them cooked evenly. After stirring for 15 or 20 minutes I would let settle, and draw off some whey. Then keep well stirred, and when the acid is beginning to show on the hot iron, and if the curd is soft, I would raise the temperature up two or three degrees. This will firm the curd for dipping. I would dip a gassy curd with $\frac{1}{4}$ inch of acid.

As to stirring a gassy curd after dipping, I want to take into consideration the amount of acid, the firmness of the curd, and the state of the weather, and stir accordingly. The main thing I want to do is to keep the acid developing, and have a nice, firm curd. If I stir too dry I will stop the acid and will spoil all I have been working for.

In handling curd in the curd sink, I want to turn often, piling three or four deep in sink, and mill when flaky and the gas is well developed and from $1\frac{1}{2}$ to $1\frac{3}{4}$ inch of acid.

Now, as to handling curd after milling. There are different ways of stirring curd. The way I want to have a curd stirred is to go at it as if you intended to stir it, and not to put in time. I think we cannot do too much stirring at the right time. That time is right after milling, and not four or five hours after, when the curd is cold. I want it stirred so that no two pieces will be sticking together. When it is nice and silky, I would pile it up for a few minutes, then pull down again, and stir well, and do this until you have it as fine as silk. Then salt. In salting I would use a little less salt if the curd is losing butter. Stir the salt in well and pile up, and then spread it out evenly over the sink and let it lie for half an hour before putting to press.

The President: In the past I have not been in favor of washing gassy curds, but last summer while visiting the Wyandotte factory they were getting bad milk. They had plenty of pure water and they washed almost every curd, and I must say I never saw finer cheese. Their September cheese was the finest cheese I have seen this year, and the maker said he did not think there were more than two or three curds he had not

washed. He used one to two barrels of water at a temperature of 105°. After milling his curd he stirred it until it began to get a little close, so that it would not mat together, and then he gave it a thorough good washing.

Mr. GRAY: This fall I had the pleasure of visiting the Wyandotte factory and saw their October cheese. They told me every curd had been washed in water, and that in future they intended to wash all of them good and bad. Their cheese was as fine a lot as I had ever seen.

Mr. ROGERS: Do you think gassy curd is caused by the milk from the farm?

Mr. McDONALD: I think there is where it starts. I think it is always in the milk when we get it.

A MEMBER: What do you think would prevent it?

Mr. McDONALD: Airing, I think would be a good thing. Some claim it is caused by water, and some claim it is by feeding. I think aerating the milk will help it.

T. C. ROGERS: We have been experimenting at the Guelph College for the purpose of hunting up the cause of gas in curds, and we have been doing everything we could to trace it, and we failed every time. We have aerated the milk thoroughly, and have got the patrons to do it. Last spring we decided to go out to the patrons in the evening, and just as soon as the cows were milked, bring it into the Dairy Department and do the aerating ourselves. We divided it equally, and one part was thoroughly aerated and the other part was not aerated at all; and when we came to make the cheese it did not make any difference. And we repeated that often enough to find out that there did not seem to be much difference in the way it was handled. Our cheesemaker said it was our own dairy milk caused the trouble, so we made up our own dairy milk. We had not so much gas in it, but we could not find out what was the cause. I believe there has not been enough attention paid to the temperature. When a cheesemaker takes hold of a vat of milk it is temperature with him all the way through, but farmers have not been taught the proper temperature in handling the milk. We have found that to prevent thick cream rising on the milk, cooling it down to 75° will do all right. In very hot weather it is necessary to go down to about 68°. I think if there was enough attention paid to the temperature there would not be the tons and tons of milk returned from our cheese factories that there are at the present time.

Mr. McKENZIE: Would Mr. Rogers explain the effect of cooling before airing.

Mr. ROGERS: Air and cool at the same time. Be particular about that.

CURING CHEESE.

BY W. A. EDGAR, CULLODEN.

In spring we want a fast-curing cheese for quick shipment. Keep the temperature of the curing-room as even as possible at about 70° Fahr. Turn the cheese at least twice a day, morning and evening. This is important, as it materially aids the success of curing.

In summer keep the temperature of the curing-room at as near as possible 60° Fahr. Turn the cheese at least once a day, and do all that is in your power to have the temperature as regular as possible. Have all the light possible during the process of curing, to guard against mold on cheese. Keep the curing-room with about 60 per cent. of moisture or indicating on the hygrometer at between normal and moist.

Have some ice ready for your curing-room for the hot weather, or a sub-earth air duct for the purpose of regulating the temperature. We want a curing-room with a good high ceiling. I have an eleven foot ceiling with a good air space above, and have ventilators through the ceiling, with a box connecting with a ventilator on the roof of the curing-room, with a slide in the flue for to open or shut as wanted, for the purpose of opening to have a perfect circulation and give cooler air to vent and expel the warmer air in the

room. I cannot go into details in this paper and describe a model curing-room, as my paper is on curing cheese; but we makers must study the ventilating of our rooms more, so that we can get our cheese more pure air while in the curing-room. In my experience it takes a man quite a long time and requires a good deal of study to know just how to operate a curing-room to the very best advantage. We must figure on it and use our very best judgment to get the results wanted. When the outside temperature is at about the right degree, open your curing-room and let all the pure fresh air in possible.

In fall, cure the cheese at about 60°, and use heat when necessary to keep the temperature right. To prevent cheese from drying too much on the sides or cracking on the ends, keep a pot of water sitting on top of the stove or furnace.

Have cheese turned regularly and with great care at all seasons, and do not have the cheese bruised or corners broken. Have the curing room swept at least once a week, and everything kept clean and tidy.

Do not allow cheese to be shipped until they are properly cured. I believe at times there are a great many cheese shipped too green, or before they are cured properly; and if the conditions are not favourable the result will be a bad mark for that factory's cheese and cheesemaker.

Salesmen and makers should work hand in hand together. Every maker should be an efficient judge of cheese and know the quality of his goods, and advise salesman when best to sell the cheese.

In conclusion I would say that no matter how well cheese may be put together in the making-room, the quality can be greatly improved or deteriorated in the curing-room.

The President then declared the convention adjourned.

APPENDIX.

LIST OF MEMBERS FOR 1899.

CHEESE AND BUTTER ASSOCIATION OF EASTERN ONTARIO.

Name.	P. O. Address.	Name.	P. O. Address.
Ashley, H. (Honorary)	Belleville.	Gibson, O. L	Caintown.
Alexander, A	Napanee.	Garrow, W. T	Napanee.
Aderhold, E. L	Neenah, Wis.	Gillespie, W. J	Plainfield.
Anderson, William	Bailieboro.	Gilroy, C. J	Glen Buell.
Balkwell, George	Lafontaine.	Hoskin, Thomas	Grafton.
Bird, Morden	Stirling.	Harriston, G. H	Cookston.
Brenton, F. W	Belleville.	Hodgsor, H. A	Montreal, Que.
Blakely, W. S	Cherry Valley.	Howey, H	Newburg.
Brown, S. H	Huntingdon, Que.	Hogan, James, J	Peterboro.
Bailey, Samuel	Campbellford.	Hurst, G. A	Gananoque.
Brown, Wm. A	Campbellford.		
Bronson, Chas. L	Stirling.	Irvine, T. H	Halloway.
Barrigar, Edward	Cass Bridge.		
Bennett, C. S	Huntingdon, Que.	Jose, Dr. Chas	Foxboro.
Blanchard, F	Mallorytown.	Jackson, James	Spencerville.
Benson, Richard	Picton.		
Barton, John	Irena.	Kerr, J. A	Stirling.
Brophy, F. J	Twin Elm.	Kidd, Edward	North Gower.
Bawden, Joseph	Kingston.	Kitchen, Alex	Burnbrae.
		Keating, James	Lansdowne.
Campbell, A	Ormond.	Ketcheson, W	Wallbridge.
Cranston, A	Elginburg.	Ketcheson, Walter	Wallbridge.
Cummings, J. W	Grafton.		
Church, Joseph E	Lyndhurst.	Lowery, J. B. (Instructor)	Frankford.
Carlaw, Thomas B	Warkworth.	Lindeback, C. R	Montreal, Que.
Chown, S. C	Belleville.	Linn, Wm. R	Big Springs.
Cleall, George	Napanee.	Leavine, Frank	Elgin.
Cassan, Frank	Campbellford.	Lister, R. A. (J. De L. Tache, Man)	Montreal, Que.
Derbyshire, D	Brockville.	Leake, George	Tichborne.
Duff, William	Inverary.	Lappan, J. J	Melcombe.
Dargavel, Jno. R	Elgin.		
Dillon, Thomas J	Charlottetown, P.E.I.	Monroe, William	St. Elmo.
Daly, P. R	Foxboro.	Moreland, Jno	Sydenham.
Dewey, Edward	Madoc.	Murphy, R. G	Elgin.
Darling, L. A	Morganston.	Marker, C	Calgary, N.W.T.
Downer, Albert	Cameron.	Magrath, W. J	Belleville.
Darling, T. J	Lansdowne.	Monroe, M. F	Lancaster.
		Mustard, George	Elgin.
Eager, William	Morrisburg.		
Edgeley, C. A	Maxville.	McTavish, John	Vancamp.
		McCann, T. E	Wellman's Corners.
Free, H. R	Coldsprings.	McKoen, Frank	Sharpton.
Falconer, Dr. D. W	Foxboro.	McGrath, Joseph	Sunbury.
Ford, Thomas Henry	Wolfe Island.		
Foulds, J. H	Martintown.	Oakney, J. W	Campbellford.
		O'Keefe, D	Battersea.
Gallagher, L. L	Wilton.		
Gay, John	Sine.	Purvis, A. P	Maxville.
Gillen, Daniel	Madoc.	Pearce, John S	London.
Goodman, B	Norham.	Publow, G. G	Perth.
Gullett, W. H	Wellman's Corners.	Pollard, George H	Burnbrae.

LIST OF MEMBERS.—*Continued.*

Name.	P. O. Address.	Name.	P. O. Address.
Poole, James	Waba.	Thompson, Thos. H.	Madoc.
Parr, Frank	Selwyn	Twiddy, Harford	Madoc.
Palen, I. B.	Orland.		
		Whitton, James	Warkworth.
Ritchie, Alexander	Inverary.	Willoughby, J	Ellisville.
Reddick, George	Villiers.	Wade, Henry	Toronto.
Robinson, J. E.	Rossmore.	Ward, R. W	Foxboro.
Robertson, D. A	Wellman's Corners.	Ward, George L	Foxboro.
Richardson & Webster	St. Marys.	Ward. E. P	Portsmouth.
Rogers, D. D. (M.P)	Kingston.	Wallbridge, J. S	Belleville.
		Way, R. G.	Trenton.
Soper, H. L	South Mountain.	Waghorn, Albert G.	Black River Bridge.
Spence, S. S	South Dummer.	Winter, Thomas I.	Kingsford.
Sager, Frank	Stirling.	Whattam, T. C.	Picton.
Spence, M. B.	Halloway.		
Stark, T. C.	Pitts ferry.	Vermilyea, J. W	Belleville.
Shorthall, L. P	Washburn.	Vanluven, F. E	Napanee.
Sexsmith, Geo. A.	Wallbridge.		
Sprague, Jno	Ameliasburg.	Zufelt, L. A	Chesterville.

CHEESE AND BUTTER ASSOCIATION OF WESTERN ONTARIO.

Name.	Post office.	Name.	Post office.
Abbey, R	La Salette.	Boyes, Fred	Mapleton.
Adams, C. F	Trowbridge.	Booth, Ed	Ingersoll.
Agur, E	Brownsville.	Borland, John	Eastwood.
Aldrich, A	Cheapside.	Brett, Wm.	Ingersoll.
Alexander, Jas	Guelph.	Brodie, John	Mapleton.
Angus, W. D. A	Atwood.	Brodie, W. A	Glanworth.
Armstrong, W. J.	Unionville.	Brooks, F. H.	Holbrook.
Atkinson, W. J	Kintore.	Brown, W. W	Attercliffe Station.
Attwood, Chas	Shelburne.	Brodie, Geo	Gladstone.
Aylesworth, Jas	Madoc.	Brill, J. J	Guelph.
		Brubacher, W. H.	St. Jacobs.
Ballantyne, Thos. jr	Stratford.	Brunskill, —	Yarmouth Centre.
Ballantyne, R. M.	Stratford.	Bray, Jacob	Listowel.
Barr, G. H	Sebringville.	Bristow, Jas	Sebringville.
Barr, Robt	Ethel.	Burgess, Jas	Bluevale.
Backet, Miss Sara	Fanshawe.	Benner, T. W	Bayham.
Bell, A. T	Tavistock.		
Bell, H. J	Oxley.	Campbell, C. A	Stratford.
Bell, E. A	Crown Hill.	Cairns, Lewis	Straffordville.
Biffin, A. J.	Charlottetown, P.E.I.	Carmichael, Jas	Arva.
Biffin, Jas	Clarence Creek.	Callan, Peter	Innerkip.
Bonesor, Jas	Bayham.	Caddy, Thos	Banner.
Bothwell, W. A	Hickson.	Cameron, D. W	Holstein.
Boyes, J. W	Leesboro'.	Campbell, D	Gamebridge.
Boyes, Frank	Putnam.	Carter, E	Bayham.
Boyes, Geo. A	Mapleton.	Carson, W. J	Vernon.
Bowles, A. W	Randolph.	Campbell, Geo	Innerkip.

List of Members.—*Continued.*

Name.	Post office.
Cameron, Wyatt	Wyecombe.
Chalmers, J. W	Poole.
Christie, P	Trecastle.
Clarke, A. F	Poole.
Clancey, A	Rockwood.
Copeland, John	Harriston.
Cousins, Geo	New Hamburg.
Connolly, Jas	Porter Hill.
Cohoe, H. G	New Durham.
Cohoe, E. L	Humberstone.
Corless, J. G	Burgessville.
Cooper, C. R	Toronto (Salt Works).
Cook, J. H	Kerney, Neb., U.S.A.
Connor, John	Pinkerton.
Cox, John	Guelph.
Cosh, Newton	Brantford.
Court, W. C	Putnam.
Copeland, Jos	Avonbank.
Crosby, G. E	Marden.
Crealey, J. E	Strathroy.
Cuckow, Osborne	Kelvin.
Cuddy, Robt	Woodstock.
Dalton, W. H	Crumlin.
Davis, J. F	Kirkton
Dawson, Robt	Brownsville.
Dean, Fred	St. Marys.
Dempsey, D. A	Stratford.
Dixon, J. H	Atwood.
Downham, Walter	St. Thomas.
Dow, N. S	Stratford.
Durst, F. W	Canboro.
Duncan, H. S	Oil City.
Dunlop, R	Mohawk.
Dyson, Robt	Forks Roads.
Eagle, Harold	Attercliffe Station.
Eccles, John	Norwich.
Edgar, W. A	Culloden.
Elliott, Jas	Tilsonburg.
Empey, G. W	Culloden.
Ferguson, F. W	Moorefield.
Fisher, J. J	Stratford.
Flots, D. C	Port Elgin.
Ford, E. G	Lynn Valley.
Fotheringham, J. W	Courtice.
Ford, W. H	Bloomburg.
Forbis, D	Stratford.
Frudell, J. E	Stoney Point.
Fraser, Neil	Vankleek Hill.
Gibson, R. T	Avonbank.
Ginther, Ezra	Winger.
Gillespie, E	Cross Hill.
Gillies, A	Moffat.
Goodhand, G	Milverton.
Gray, James A	Listowel.
Gray, W. W	Stratford.
Gray, W. G	St. Thomas.
Grieves, T	Wyandotte.
Grills, F	Sydenham Crossing.
Grisdale, B	St. Mark.
Griffith, M. L	St. Catharines.
Gracey, A	Woodstock.
Groat, R	Georgetown.
Harris, W. W	Brussels.
Harris, A. M	Lakeview.
Halliday, W	Chesley.
Hamilton, Walter	Ethel.
Hatfield, P	Tilsonburg.
Henderson, E. G	Windsor.
Hodgson, G	Walkerton.
Holmes, W. J	Monkton.
Hodgson, H. A	Montreal.
Hodgson, Harry	Listowel.
Hunter, E	Woodstock.
Hussey, Jackson	Drayton.
Isard, J. S	Paisley.
Immel, G J	Mildmay.
Isaacs, John R	London.
Immel, H. J	Mildmay.
James, D. A	Nilestown.
James, J. A	Nilestown.
Johnston, Robt	Bright.
Johnson, J. S	n.
Johnson, E. M	Innerkip.
Jordan, Prof. W. H	Geneva, N.Y.
Jenkins, Chas	Thamesford.
Kay, Chas	Fergus.
Kent, Wesley	Woodstock.
Kennedy, E. E	Welland.
Kennedy, Geo	Winthrop.
Kean, J. C	Harriston.
Kidd, Martin	Aylmer.
Kitchen, S. G	St. George.
Kingsbury, Ed	Arkell.
Kirkley, H	Norwich.
Knecthel, Moses	Dorchester Station.
Knight, A	Sardis, B.C.
Kuntz, E. G	Formosa.
Lander, Chas	Mitchell.
Laidlaw, Wm	Guelph.
Laing, J. R. A	Avonbank.
Leach, Z. A	Shakespeare.
Lipsit, J. B	Straffordville.
Lockyer, E. A	New Durham.
Lochead, Wm	Atwood.
Loney, Wm	Grand Valley.
Long, R	Solway.
Lorch, A	Elmira.
Luton, C. O	Belmont
Lucas, Fred	Nixon.
Mallory, J C	Yarmouth Centre.
Marshall, G. B	Tiverton.
Mannell, J. H	Hollen.
Martin, W	Avonton.
McAllister, A	Croswell, Mich.
McKay, Alex	Brooksdale.
McIlwraith, J. H	Bookton.
McKie, Geo	Norwich.
McMillan, D	Stratford.
McDermott, A	Ridgetown.

List of Members.—*Continued.*

Name.	Post office.	Name.	Post office.
McDonald, Geo	Bluevale.	Pearce, H. Leslie	Tyrconnel.
McEwen, Arthur	Sebringville.	Peters, Oliver	Stratford.
McEwan, F. S., M.P	Verschoyle.	Peters, R. A	Uptergrove.
MacLaren, A. F	Stratford.	Phelps, L L	Clear Creek.
McLaren, W. A	Avening.	Philips, R	Rothsay.
McQuaker, J	Owen Sound.	Phelps, Louis	Sebringville.
McIntyre, L	Lyons.	Platt, John	Derby, England.
McFeeters, J. A	Guelph, O.A.C.	Prain, John	Harriston.
McKay, W. A	Underwood.	Price, W. W	London.
McCuen, Jas	Guelph.	Proctor, L	Constance.
McIntosh, G	Mosboro.		
McEwen, Jas	Appin.	Randall, D	Ayton.
McIntyre, John	Palmerston.	Rance, Hugh	Guelph.
McLeary, J. D	Tilsonburg.	Reynolds, H. E	Solina.
McFarland, Robt	Warner.	Reynolds, D. J	Solina.
McArthur, R	Brussels.	Reynolds, J. A	Valetta.
McIntyre, H	Ilderton.	Richardson, L. R	Strathroy.
McKellar, W. H	Colinville.	Richardson, Fred	St. Marys.
McCrae, John	Verschoyle.	Richardson, Chas	St. Marys.
McGregor, J. E	Stratford.	Rice, A. J	Buffalo, N.Y.
MacLaren, J. B	Ingersoll.	Riddell, A. D	Shakespeare.
McEwen, H	Verschoyle.	Rowe, Edgar	Bornholm.
Messer, W	Bluevale.	Robson, Wm	Campbell's Crossing.
Millar, T. B	London, Box 334.	Robinson, J. W	Mitchell.
Millson, Frank	Winthrop.	Rogers, T. C	Guelph.
Miller, J. F	St. George.	Rollings, Walter	Walsh.
Mitchell, J. W., B.A	Lansdowne.	Robertson, J. B. P	Strabane.
Milne, John	Toronto.	Rudd, D. E	Guelph.
Millar, Miss Pella	Coleman.	Riesberry, R	Bright.
Morrison, Jas	Stratford.		
Morris, Wm	Avon.	Salonde, T. B	Chevalier.
Moore, Bert	Blyth.	Sailsbury, T	Bookton.
Macin, Jas	Sheffield.	Sandwith, H. B	Sandhurst.
Menzies, G	Sheffield.	Schweitzer, Oscar	Cassel.
Moore, M	Windsor.	Scott, D. M	Holmesville,
Morrison, Miss Aggie	Newry.	Schrag, Chris. K	Parrysburg, N.Y
Morrison, Miss Mary	Newry.	Shrumm, Alf	Bismarck.
Morrison, E	Straffordville.	Shuttleworth, A. E	Guelph, O.A.C.
Morrison, James I	Woodstock.	Slater, J. O	Kingston.
Morrison, A. A	Fullarton's Corners.	Smith & Russell	Alton.
Monck, J. A	Putnam.	Smith, Wm. S	Stratford, Box 655.
Morrison, M	Harriston.	Smith, R. M	Beachville.
Moulton, Jas	Sheffield.	Smith, Arch	Beachville.
Muma, John	Avonton.	Smuck, Nolton	Glanford.
Muir, J. B	Ingersoll.	Smith, W. W	Mohawk.
Murray, John R	Avonton.	Smith, A. D	St. Thomas.
		Smith, P. D	Culloden.
Nancekeville, Wm	Ingersoll.	Snider, W. H	St. Jacobs.
Neigh, Amos	Mitchell.	Southwick, H. A	Avonton.
Norman, F	Poole.	Squires, W	Bornholm.
		Struthers, Jas	Owen Sound.
Oliver, Walter T	Arva.	Stratton, R. W	Guelph, O.A.C.
Oliver, R	Trowbridge.	Stacey, John E	Mitchell.
O'Flynn, J	Tavistock.	Stacey, W. P	Fullarton.
O'Riley, W. P	Ayton.	Steinhoff, I. W	Stratford.
		Stevens, Thos	Proton Station.
Paterson, J. G	Molesworth.	Stewart, Alex	Guelph.
Palmer, W. J	Toronto.	Stewart, J. F	Comber.
Paget, J. N	Canboro.	Stillman, J. H	Meadowvale.
Paterson, Jas	New Durham.	Stacey, James H	St. Marys.
Parker, A. A	Rockford.	St. Clair, Jas	Guysboro.
Patterson, Geo	West Flamboro'.	Shalitzka, J. F	Atwood.
Parmell, Harry	Woodstock.	Taylor, Arthur	Stafford.
Pearce, J. S	London.	Thomson, W. B	Nile.

LIST OF MEMBERS.—*Concluded.*

Name.	Post office.	Name.	Post office.
Thomas, R A	Barrie.	Wilson, O	Ilderton.
Thomson, F. A	Bennington.	Williams, J. H	Lyons.
Thomas, H. J	Ingersoll.	Widmeyer, Otto	Fergus.
Tillson, E. D	Tilsonburg.	Wieland, A. G	Montreal, Que.
		Wightman, W. T	Syracuse, N.Y.
Watson, D. B	Guelph.	Wilkinson, James	Cheltenham.
Watson, J. A	Eden Mills.	Wilson, C. C. L	Ingersoll.
Wenger, A	Ayton.	Wood, A. R	Avonton.
White, Harry	Stratford.	Woolley, J. H	Simcoe.
Wheaton, J. W	Toronto.	Woods, G. R	Avonton.
Whitelaw, Robt	Woodstock.	Wyles, W	Woodstock.
Wilson, Hugh E	Arkona.		
Wilson, L	Molesworth.	Young, M. M	East Aurora, N.Y.

CHEESE AND BUTTER MAKERS' ASSOCIATION OF WESTERN ONTARIO.

Name.	Post office.	Name.	Post office.
Agur, E	Brownsville.	Calder, A. G	Clarksburg.
Archibald, Albert	Kingsmill.	Chalmers, Alex	Monkton.
Aldrich, A	Cheapside.	Chowan, R	Thamesford.
Abby. R. L	La Salette.	Cleland, James	Listowel.
Angus, W. D	Atwood.	Clarke, A. F	Poole.
Aldrich, Richard	Cheapside.	Climie, W	Listowel.
Burgess, James	Bluevale.	Connolly, James	Porter's Hill.
Barr, G. H	Sebringville.	Carty, John	Kinkora.
Brodie, John	Mapleton.	Connolly, John	Malcolm.
Brown, W. W	Attercliffe Station.	Cuddy, R	Woodstock.
Barry, T. D	Ingersoll.	Cosb, Newton	Brantford.
Bell, E. A	Crown Hill.	Clarridge, J. W	Glen Huron.
Brown, S. P	Birnam	Carrigan, Philip	Arkona.
Boyes, Frank	Putnam.	Dawson, R. K	Sebringville.
Boyes, J. W	Lee-boro'.	Dean, Fred	St. Marys.
Brodie, G. B	Gladstone.	Dean, H. H	Guelph O, A. C.
Boyes, Geo. A	Mapleton.	Dillon, T. J	Charlottetown, P.E.I.
Brill, S. R	Teeswater.	Duncan, Louis A	Forest.
Bell, A. T	Tavistock.	Dunn, Thomas W	Embro.
Bongard, W. L	Crampton.	Darroch, A. W	Palmerston.
Borland, J	Eastwood.	Empey, Geo. W	Culloden.
Brooks, F. H	Holbrook	Eagle, Harold	Attercliffe Station.
Brodie, W. A	Glanworth.	Edgar, W. A	Culloden.
Baskett, John	Vittoria.	Everett, C. H	Eden.
Bristow, James	Sebringville.	Fisher, J. J	Stratford.
Bothwell, W. A	Hickson.	Foy, Arnold	Brownsville.
Bell, W. A	Pine River.	Facey, S. E	Harrietsville.
Bootte, George E	Ingersoll.	Ferris, Thomas	Ingersoll.
Ballantyne, R. M	Stratford.	Goodhand G. E	Milverton.
Brown, M. R	Appin.	Gray, J. A	Listowel.
Barr, Robert	Ethel.	Goodhand, T. C	Milverton.
Ballantyne, T. J	Lambeth.	Gracey, A. E	Woodstock.
Brown, James	Ingersoll.	Grieves, Thomas	Wyandotte.
Court, W. C	Putnam.	Henderson, T. J	Toronto.
Cousley, W. D	Brussels.	Harris, W. W	Brussels.
Connolly, James	Ingersoll.	Hamilton, Walter	Ethel.
Corliss, J. G	Burgesville	Hartley, W. J	New Durham.

LIST OF MEMBERS.—*Concluded.*

Name.	Post office.	Name.	Post office.
Hussey, Jackson	Drayton.	McKenzie, Dan	Donegal.
Holmes, Alf. L.	Newton.	McKay, Alex	Brooksdale.
Holmes, J. L.	Carthage.	Norman, F. A.	Poole.
Hacking, J. A	Listowel.	Newcombe, N.	Britton.
Isard, J. S	Paisley.	Nimmo, E.	Ripley.
Immel, G. J	Mildmay.	Nimmo, T. E	Ripley.
Immel, H. J	Mildmay.	O'Flynn, Timothy	Tavistock.
Johnson, J. S.	Ingersoll	Oliver, Robert	Trowbridge.
James, D. A	Nilestown.	O'Flynn, J. J	Kinkora.
Johnson, Robert	Bright.	Connor, M. J	Kintail.
Johnson, E. M	Innerkip.	Pollard, Albert	Tilsonburg.
Jacobs, Alex	Milverton.	Price, W. W	London.
Johnson, E. D	Otterville.	Prain, John	Harriston.
Kenny, Geo.	Winthrop.	Publow, G. G	Perth.
Kent, W.	Woodstock.	Peters, Oliver	Stratford.
Karns, Louis	Straffordville.	Paget, J. N	Canboro'.
Klug, J. H.	Drew.	Pomeroy, Irwin	Pine River.
Kellum, Walter	Bervie.	Pow. John	Vittoria.
Kaltfleich, John	Tavistock.	Pettypiece, Wm.	Motherwell.
Kingsbury, Edward	Arkell.	Patterson, J. G.	Molesworth.
Lawrence, John	Newry.	Pearce, J. S.	London.
Leach, J. A.	Shakespeare.	Park & Park	Hamilton.
Lachapell, A.	Holbrook.	Rowley, F. L	Paisley.
Leach, A. W.	Trowbridge.	Ralph, Geo. F.	Dorchester Station.
Laing, J. R. A.	Avonbank.	Russell, J A	Gobles.
Laughlin, Wm	Thamesford.	Rollings, Walter	Walsh.
Larch, Albert	Elmira.	Ranton, S. S	Goldstone.
Lockwood, O. D	Londesboro'.	Ruthing, Lorne	Carthage.
Luton, C O	Belmont.	Ralph, Charles	London.
Millar, T. B	London, Box 334.	Richardson & Webster	St. Marys.
Morrison, James	Stratford.	Ray, I. H.	Constance.
Myrrick, Robert	Springford.	Riach, F C	Newry.
Millson, A. E.	Lakelet.	Rogers, T. C	Guelph O. A. C.
Murray, Robert A	Nilestown.	Rose, Laura	Guelph, Box 25.
Menzies, G.	Sheffield.	Stratton, R. W.	Guelph O. A. C.
Martin, W.	Avonton.	Stover, Thomas	Tilsonburg.
Morrison, James F	Woodstock.	Smith, Archie	Beachville.
Morphy, H. B	Listowel.	Scott, J. H.	Harrietsville.
Maines, D. W	Millarton.	Switzer, Oscar	Chesterfield.
Morrison, Mary	Newry.	Scott, Duncan	Holmesville.
Morrison, Aggie	Newry.	Sinclair, D.	Cotswold.
Morrison, Albert	Fullarton.	Sweet, W. H.	Tilsonburg.
Muir, J. B	Ingersoll.	Stanton, J	Kenilworth.
Moore, G.	Rothsay.	Stewart, Charles	Flesherton.
Millar, J. F.	St. George.	Stevens, Thomas	Proton Station.
Marshall, T. B	Tiverton.	Stacey, Thomas	Fullarton.
Martin, M. W	Teviotdale.	Steinhoff, I. W.	Stratford.
Morris, Wm	Ingersoll.	Smith, F.	Listowel.
McKay, Alex.	Brookdale.	Taylor, F. C.	Gorrie.
McCully, W J	Stratford.	Thompson, J. L.	Hawkesville.
McLachlin, N. S.	Henfryn.	Waddell, Wm.	Strathroy.
MacLaren, A F	Stratford.	Wilson, J. A.	Dromore.
McCallum, Alex	Medina	Wilkinson, J. H.	Verschoyle.
McKenzie, Geo.	Ingersoll.	Wenger, Aaron	Shakespeare.
McDonald, Geo.	Bluevale.	Wood, A. R.	Avonton.
McIntyre, John A.	Palmerston.	White, H	Hawkesville.
McDonald, J. H.	Listowel.	Wilson, Frank	Tavistock.
McKenzie, Alex.	Donegal.	Wagg, A. J.	Mindemova.

OFFICERS FOR 1899.

CHEESE AND BUTTER ASSOCIATION OF WESTERN ONTARIO.

Hon. President	Hon. Thos. Ballantyne, Stratford.
President	Harold Eagle, Attercliffe Station.
1st Vice-President	R. M. Ballantyne, Stratford.
2nd Vice-President	Aaron Wenger, Ayton.
3rd Vice-President	Jas. Connolly, Porter Hill.
Directors: Division No. 7	John Prain, Hamilton.
" " 8	J. N. Paget, Canboro'.
" " 9	Robt. Johnston, Brantford.
" " 10	G. H. Barr, Sebringville.
" " 11	A. F. MacLaren, M.P., Stratford.
" " 12	J. A. James, Nilestown.
" " 13	Geo. E. Goodhand, Milverton.
Instructors	James Morrison, Brantford.
"	O. O. Luton, Belmont
"	George McDonald, Bluevale.
"	Arch. Smith, Beachville.
Representatives to the Industrial Exhibition	H. Eagle, Attercliffe Station.
" " "	A. F. MacLaren, M.P., Stratford.
Representatives to the Western Exhibition	T. B. Millar, London.
" " "	S. G. Kitchen, St. George.

CHEESE AND BUTTER ASSOCIATION OF EASTERN ONTARIO.

President	D. Derbyshire, Brockville.
1st Vice President	John McTavish, Vancamp.
2nd Vice-President	L. L. Gallagher, Wilton.
Secretary	R. G. Murphy, Elgin.
Treasurer	P. R Daly, Foxboro'.
Directors: Division No. 1	Edward Kidd, North Gower.
" " 2	William Eager, Morrisburg.
" " 3	John R. Dargavel, Elgin.
" " 4	James Whitton, Wellman's Corners.
" " 5	T. B. Carlaw, Warkworth.
" " 6	Henry Wade, Toronto.
Instructors	G. G. Publow, Perth.
"	A P. Purvis, Maxville.
"	L. A Zufelt, Chesterville.
"	G. H. Bensley, Warkworth.
"	J. B. Lowery, Frankford.
"	R. W. Ward, Peterboro'.

CHEESE AND BUTTER MAKERS' ASSOCIATION OF WESTERN ONTARIO

President	T. B. Millar, London, Box 334.
Vice-President	G. H. Barr, Sebringville.
Directors	George E. Goodhand, Milverton.
"	John Brodie, Mapleton.
"	E. Agur, Brownsville.
"	James Morrison, Stratford.
"	T. D. Barry, Ingersoll.
"	W. W. Brown Attercliffe Station.
"	T. E. Nimmo, Ripley.
Secretary-Treasurer	John Brodie, Mapleton.

FINANCIAL STATEMENT FOR 1898.

CHEESE AND BUTTER ASSOCIATION OF EASTERN ONTARIO.

Receipts.		Expenditure.	
Cash on hand from last audit	$ 935 08	Expenses, convention and regular meeting	$598 75
Membership fees	63 00	Reporter	80 00
Advertisements	109 50	Printing	153 75
Proceeds of Chk., Town of Lindsay	124 65	Convention at Dairy School, Kingston	172 00
Government grant	3,250 00	Fine remitted	25 00
Factory fees from Inspectors	2,837 75	Local Committee, Belleville	25 00
Prosecutions	1,081 42	Board meeting, Toronto	205 00
		Officers' salaries	180 00
		Grant to Industrial Exhibition and Fat Stock Show	100 00
		Attendant, Dairy Department, Industrial Exhibition	22 45
		Stationery and postage	6 00
		Charges on draft	3 00
		Local Committees attending sundry Cheese Boards	57 00
		Acid for testing	24 00
		Inspector H. Howey, salary	755 00
		" R. W. Ward, "	785 00
		" J. A. Kerr, "	805 00
		" G. Bensley, "	740 00
		" A. P. Purvis, "	1,062 00
		" G. G. Publow, "	990 00
		" L. A. Zufelt, "	912 00
		" M. Sprague, "	642 50
		Balance on hand	57 95
Total	$8,401 40	Total	$8,401 40

We hereby certify that we have examined the accounts and vouchers of P. R. Daly, Esq., Treasurer, Cheese and Butter Association of Eastern Ontario, and find the same correct in accordance with foregoing statement.

MORDEN BIRD,
F. W. BRENTON, } *Auditors.*

Kingston, January 12th, 1899.

CHEESE AND BUTTER ASSOCIATION OF WESTERN ONTARIO.

Receipts.			Expenditure.		
To cash on hand from 1897		$ 277 48	Liabilities from 1897		$1,643 21
Membership fees		229 00	Convention expenses		403 37
Legislative grant		3,250 00	Directors' and Committee expenses		87 45
City of London, grant *re* Convention, 1898		150 00	Reporting Convention		70 00
Bonus *re* Convention Programme, 1898		85 00	Instructors, T. B. Millar	$945 20	
Instructors' fees, T. B. Millar	$442 70		Jas. Morrison	965 05	
" Jas. Morrison	517 55		Jas. Struthers	56 00	
" Jas. Struthers	12 00				1,966 25
		972 25	Auditors		8 00
Prosecutions, T. B. Millar	$52 50		Officers' salaries		300 00
" Jas. Morrison	97 50		Postage		30 40
		150 00	Stationery		10 00
			Total		$4,518 68
Total		$5,113 73	Balance forward to 1899		$595 05

ANNUAL REPORTS

OF THE

LIVE STOCK ASSOCIATIONS

OF THE

PROVINCE OF ONTARIO

1898-9.

DOMINION CATTLE BREEDERS' ASSOCIATION.
DOMINION SHEEP BREEDERS' ASSOCIATION.
DOMINION SWINE BREEDERS' ASSOCIATION.
CANADIAN HORSE BREEDERS' ASSOCIATION.
DOMINION SHORTHORN BREEDERS' ASSOCIATION.
CANADIAN AYRSHIRE BREEDERS' ASSOCIATION.
HEREFORD BREEDERS' ASSOCIATION.
HACKNEY HORSE SOCIETY.
CLYDESDALE HORSE BREEDERS' ASSOCIATION.
SHIRE HORSE BREEDERS' ASSOCIATION.
DOMINION DRAUGHT HORSE BREEDERS' SOCIETY.

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1899

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ANNUAL REPORT

OF THE

LIVE STOCK BREEDERS' ASSOCIATIONS.

1898-99.

To the Honorable the Minister of Agriculture :

I have the honor to submit herewith the Annual Reports of the Dominion Cattle, Sheep and Swine Breeders' Associations.

Your obedient servant,

F. W. HODSON,

Secretary.

ANNUAL REPORT

OF THE

DOMINION CATTLE, SHEEP AND SWINE BREEDERS' ASSOCIATIONS.

1898-99.

REPORT OF THE SECRETARY.

A review of the work of the Live Stock Associations during the past year must necessarily deal with the following subjects: Inter-provincial trade—and inseparably connected therewith are transportation and the publication of the *Ontario Agricultural Gazette;* second, the growth of the Associations; third, the Provincial Winter Show; fourth, the financial statement, and, in the case of the Swine Breeders' Association, the Swine Records. At the end of the report are suggestions regarding future work.

INTER-PROVINCIAL TRADE.

Transportation.

During the past year purchasers of pure-bred stock, taking advantage of the cheap rates obtained from the railway companies by the transportation committee of the Live Stock Associations, have been able to have stock delivered to them at a cheaper rate than ever before. This reduced rate has also been of such service to breeders all over the Province in getting buyers for their surplus stock, that during the past year stock was bought up so closely that really good animals could only be purchased at high figures, and very few are now for sale at any price. This was in a great measure directly due to the reduced rate. The one-half rate on local shipments in Ontario was of great advantage in assembling small lots for making up a car load for the East or for the West. It is estimated by persons in a position to speak with authority that the reduced rates have been the means of increasing the inter-provincial and local trade in pure bred stock at least tenfold. Shipments of stock are being made from Ontario, east and west—to Newfoundland and to British Columbia Nothing during past years has been so great an incentive to the sale of pure bred stock in Ontario as the rates now in force, obtained by the transportation committee of the Dominion Live Stock Associations.

Special Reductions and Concessions Lately Obtained. The car load rate on pure bred live stock to British Columbia has been reduced by about sixty dollars. The rate to the Pacific coast has hitherto been so excessive that sales to British Columbia have been comparatively light. A number of enquiries have been received from breeders in British Columbia, but the rates for transportation have been so high as to be prohibitive, except in a limited number of cases. With the reduced rate from Ontario the trade with this province has greatly increased. Several car loads have been recently shipped, and additional orders are now being filled.

L. C. L. Lots of Sheep and Swine taken without being Crated. Arrangements have just been completed with the trunk lines so that less than car load lots of calves, sheep and swine consisting of over three, may be loaded in a car without being crated, simply being penned off in one end of the car.

After a good deal of correspondence and communication between the Live Stock Associations and the Government of the Northwest Territories, an agreement has been arrived at whereby one thoroughbred bull for any bona fide settler in the Northwest Territories will be delivered at any point in the Territories from any point in Ontario, for the sum of five dollars. Fuller particulars regarding the above concessions will be given further on.

Association Cars of Live Stock. During the past year a number of car loads of pure bred stock have been taken direct charge of by the Live Stock Association, and stock has been delivered at almost all points in Manitoba, the Northwest Territories and British Columbia. Below are given the details of each of the shipments from March, 1898 to July, 1899.

MARCH 9TH, 1898.

Shipped by.	P. O. Address.	Animals.	Delivered or re-shipped at.
T. C. McAvoy		Clyde mare	Winnipeg.
J. G. Snell	Snelgrove	Berkshire sow	High Bluff.
T. A. Cox	Brantford	Berkshire boar	High Bluff.
Capt. Johnson	Eramosa	Shorthorn bull	Portage la Prairie.
F. W. Stone Estate	Guelph	3 Hereford cows	Brandon.
H. D. Smith	Compton, Que	Hereford heifer	Brandon.
D. M. Wilson	Moe's River, Que	Hereford bull	Brandon.
James Leask	Taunton	Shorthorn bull	Virden.
J. G. Snell	Snelgrove	Cotswold ram	Moosomin.
G. W. Clemons	St. George	Holstein heifer and bull calf	Whitewood.
W. R. Bowman	Mount Forest	Shorthorn bull calf	Calgary.
J. A. Davidson	Ashburn	4 Shorthorn bull calves.	Calgary.

APRIL 1ST, 1898.

John Crozier	Meadowvale	2 Shorthorn bulls	Calgary.
Fred Clark	Alloa	Shorthorn bull	Calgary.
A. J. Watson	Castlederg	2 Shorthorn bulls and 2 heifers	Calgary.
Wm. Lindsay	Caledon, East	Shorthorn bull	Calgary.
J. G. Snell	Snelgrove	Hereford bull	Calgary.
John Bright	Myrtle	2 Shorthorn bulls	Calgary.
Job White	Ashburn	Shorthorn bull	Calgary.
Arthur Johnston	Greenwood	Shorthorn bull	Calgary.
David Birrell	Greenwood	4 Shorthorn bulls	Calgary.
David McCrae	Guelph	2 Galloway bulls	Calgary.

APRIL 23RD, 1898.

H. & W. Smith	Hay	Shorthorn bull calf	Winnipeg.
J. E. Shibley	Harrowsmith	Shorthorn bull	Winnipeg.
R. G. Steacy	Brockville	Ayrshire heifer and bull	Winnipeg.
Walter Nichol	Plattsville	Ayrshire heifer	Winnipeg.
W. G. Pettit & Son	Burlington	Shorthorn bull	Winnipeg.
John Isaac	Markham	Shorthorn heifer	Carberry.
John Isaac	Markham	Shorthorn heifer	Brandon.
Caldwell Bros	Orchard	Guernsey bull	Moosomin.
W. G. Pettit & Son	Burlington	2 Shorthorn heifers	Indian Head.
D. McCrae	Guelph	Galloway bull	Qu'Apelle.
Robt. Davies	Toronto	Ayrshire bull	Regina.
J. C. Snell	London	Berkshire boar	Calgary.
W. G. Pettit & Son	Burlington	Shorthorn bull	Calgary.
W. R. Stewart	Guelph	2 Shorthorn bulls	Calgary.
Wm. Butler & Son	Dereham Centre	Guernsey heifer and Guernsey bull	Calgary.

JUNE 27TH, 1898.

Shipped by.	P. O. Address.	Animals.	Delivered or re-shipped at.
Arthur Johnston	Greenwood	2 Shorthorn heifers	Bird's Hill.
J. P. Crerar for Arthur Johnston	Greenwood	2 Shorthorn heifers	Bird's Hill.
Henry Arkell	Arkell	6 Oxford sheep	Winnipeg.
Hon. John Dryden	Brooklin	Shorthorn heifer	Winnipeg.
Jas. I. Davidson	Balsam	Shorthorn bull calf and cow	Portage la Prairie.
J. & W. Russell	Richmond Hill	2 yearling Shorthorn heifers	Portage la Prairie.
W. H. & C. H. McNish	Lyn	Guernsey cow and heifer.	Portage la Prairie.

OCTOBER 4TH, 1898.

John Bell	Amber	Tamworth boar	Winnipeg.
John Dryden	Brooklin	Shropshire ram	Winnipeg.
Geo. Green	Fairview	Berkshire boar	Burnside.
John Kelly	Shakespeare	Leicester ram	Brandon.
Cen. Exp. Farm	Ottawa	2 bulls	Brandon.
Robt. Shaw & Son	Glanford Station	10 Southdown sheep	Moosomin.
Cen. Exp. Farm	Ottawa	Bull	Indian Head.
F. G. Morton	Allandale	5 Southdown sheep	Calgary.

NOVEMBER 17TH, 1898.

John Bell	Amber	Tamworth boar	Winnipeg.
Hon Sydney Fisher	Ottawa	Guernsey heifer	Portage la Prairie.
Jos. Lundy	Brampton	Jersey cow and calf	Brandon.
W. E. H. Massey	Toronto	Jersey cow	Brandon.
Alex. Smith	Maple Lodge	16 Leicester ram lambs	Dunmore Station
W. D. Flatt	Hamilton	3 cows, 2 heifer calves, 1 bull calf (Short's)	Calgary.
David McCrae	Guelph	2 Galloway bulls	High River.

FEBRUARY 4TH, 1899.

Chas. Mackey	Thornbury	3 Jersey heifers	Winnipeg.
W. D. Flatt	Hamilton	Shorthorn heifer	Winnipeg.
N. Dyment	Clappison	Ayrshire calf	Winnipeg.
Jas. German	Toronto	Shorthorn bull	Portage la Prairie.
J. G. Snell Estate	Snelgrove	Berkshire sow	Carberry.
C. R. Decker	Chesterfield	Berkshire sow	Carberry.
H. Cargill & Son	Cargill	2 Oxford sheep	Carberry.
J. Cunningham	Norval	Ayrshire heifer	Brandon.
J. E. Brethour	Burford	Yorkshire sow.	Brandon.
Chas. Michie	Fergus	Clydesdale colt	Calgary.
A. Johnston	Greenwood	Shorthorn heifer	Calgary.
T. E. Robson	Ilderton	3 Shorthorn bulls	Morley, Alta.

MARCH 2ND, 1899.

Thos. Cudmore	Hurondale	Shorthorn bull	Winnipeg.
John Davidson	Ashburn	Clydesdale mare	Winnipeg.
J. Yuill & Son	Carleton Place	Ayrshire bull calf and heifers	Portage la Prairie.
Jacob Shunk	Carman, Man.	Balance of car	Carman, Man.

APRIL 5TH, 1899.

Shipped by.	P. O. Address.	Animals.	Delivered or re-shipped at.
J. E. Brethour	Burford	2 Yorkshire hogs	Winnipeg.
J. H. Smith & Son	Highfield	Jersey cow and calf	Winnipeg.
W. D. Flatt	Hamilton	2 Shorthorn heifers	Winnipeg.
John Cumming	Londesboro	Shorthorn bull calf and heifer	Whitewood.
W. D. Flatt	Hamilton	2 Shorthorn cows, 2 Shorthorn heifers, 2 Shorthorn bulls	Calgary.
N. Dyment	Barrie	Shire horse	Calgary.
John Sharp	Toronto	Bull calf, cow, 3 heifers (Shorthorns)	Lacombe.

MAY 10TH, 1899.

S. J. Pearson & Son	Meadowvale	Shorthorn bull	Brandon.
James Leask	Wick	Shorthorn bull	Virden.
W. M Smith	Fairfield Plains	2 Ayrshire cows	Regina.
W. M. Smith	Fairfield Plains	Ayrshire bull calf	Regina.
W. M. Smith	Fairfield Plains	2 Ayrshire cows	Calgary.
Hon. John Dryden	Brooklin	Bull	Calgary.
W. C. Edwards	Rockland	5 heifers and 1 bull (Shorthorns)	Calgary.
J. P. Fisher	Hyde Park	Shorthorn bull	Cochrane.
John Weylie	Streetsville	Shorthorn bull	Morley.*
John Weylie	Streetsville	Shorthorn bull	Morley.*

*Re-shipped to British Columbia.

MAY 31ST, 1899.

Wm. Howe	North Bruce	Yorkshire sow	Winnipeg.
J. E. Brethour	Burford	Yorkshire boar and sow	Winnipeg.
Fred Row	Belmont	Tamworth boar	Winnipeg.
R. Gibson	Delaware	Jersey bull	Raeburn.
J. M. Gardhouse	Highfield	Shire filly	Portage la Prairie.
Jas. Russell	Richmond Hill	Clydesdale mare	Hargrave.
L. Burnett	Greenbank	3 Shorthorn bulls	Regina.
Geo. Douglas	Cargill	Shorthorn bull	Calgary.
Hon. J. Dryden	Brooklin	Shropshire ram	Calgary.
John Watt	Salem	Shorthorn bull	Calgary.
Wm. Willis	Newmarket	Cotswold ram	Calgary.
C. Calder	Brooklin	Shorthorn bull	Calgary.
Edward Shaw	Malton	Shorthorn bull	Cochrane.
John Bright	Myrtle	Shorthorn bull	Morley.
John Bright	Myrtle	Shorthorn bull	Morley.
Mrs. E. M. Jones	Brockville	Jersey heifer	Morley.*

*Re-shipped to British Columbia.

THREE CARS SHIPPED JUNE 21ST, 1899.

Car No. 61,202.

J. A. Galbraith	Iona	Shorthorn bull	Medicine Hat.
J. A. Galbraith	Iona	Shorthorn bull	Medicine Hat.
D. & O. Sorby	Guelph	Clydesdale horse	Calgary.
H. R. Smyth	Chatham	Shorthorn bull	Calgary.
H. R. Smyth	Chatham	Shorthorn bull	Calgary.
Geo. Raikes	Barrie	Shorthorn bull	Innisfail.
E. V. Thompson	Guelph	Shorthorn bull	Red Deer.
E. V. Thompson	Guelph	Shorthorn bull	Red Deer.
Wm. Glenn	Chiselhurst	Shorthorn bull	Red Deer.
W. F. Galloway	Ingersoll	Shorthorn bull	Red Deer.
C. B. Jeffs	Bond Head	Shorthorn bull	Lacombe.
Wm. Linton	Aurora	Shorthorn bull	Wetaskiwin.

Car No. 2,446.

Shipped by.	P. O. Address.	Animals.	Delivered or re-shipped at.
T. A. Cox	Brantford	Berkshire sow	Portage la Prairie.
J. E. Brethour	Burford	Yorkshire boar and sow	Carberry.
H. D. Smith	Compton, Que	Hereford bull calf	Brandon.
John Kippan	London	Shorthorn bull	Brandon.
W. McCrae	Guelph	Cow and calf	Virden.
T. Douglas & Son	Strathroy	Shorthorn bull	Moosomin.
T. E. Robson	Ilderton	Shorthorn bull	Whitewood.
D. C. Flatt	Millgrove	Yorkshire boar	Whitewood.
W. R. Elliott	Hespeler	Shorthorn bull	Saskatoon.
A. W. Smith	Maple Lodge	Shorthorn bull	Osler.
A. W. Smith	Maple Lodge	Shorthorn heifer	Osler.
James Peters	Arva	Shorthorn bull	Brandon.

Car No. 60,670.

J. E. Brethour	Burford	Yorkshire hog	Winnipeg.
D. C. Flatt	Millgrove	Yorkshire boar and sow	Winnipeg.
D. C. Flatt	Millgrove	Yorkshire boar	Winnipeg.
A. Johnston	Greenwood	Shorthorn bull	Regina.
D. McCrae	Guelph	Galloway bull	Regina.
P. B. Hassett	Mt. Forest	Shorthorn bull	Maple Creek.
Martin Reynolds	Mt. Forest	Shorthorn bull	Maple Creek.
F. Russell	Mt. Forest	Shorthorn bull	Maple Creek.
W. R. Elliott	Hespeler	Shorthorn bull	Maple Creek.
John Curry	Newmarket	Shorthorn bull	Walsh.
Kenneth McKenzie	Burnside	Shorthorn bull	Morley.
Kenneth McKenzie	Burnside	Shorthorn bull	Morley.

In addition to the above, shipments have been made in other directions. Last spring an order was received from the Newfoundland government for a shorthorn bull. The bull was purchased from W. G. Pettit & Son, Freeman, and so much pleased were the purchasers with the selection made that an additional order for forty breeding ewes was received—20 Cotswalds, 10 Southdowns and 10 Shropshires. This shipment has recently arrived at Newfoundland and word received from the attendant that he had arrived safely at St. John's, although a rough passage had been encountered between North Sydney, Cape Breton, and Newfoundland. We have also at the present time an order from the Newfoundland government for an entire horse. (This order has been filled to the entire satisfaction of the buyers, who have forwarded an additional order for a consignment of breeding rams.) These were trial shipments, and it is confidently expected that this is only the beginning of what will eventually be a profitable trade in pure bred stock from Ontario to Newfoundland. The animals were shipped via C. P. R. to North Sydney, where the stock was re-shipped to St. John's, via boat. The sheep were assembled at North Toronto—14 being shipped from Guelph, 10 from Brantford, and 10 from Waterford, while six were delivered at North Toronto. The C. P. R. and T. H. & B. allowed the privilege of the sheep being placed in the car without being crated, and the charges were as follows : From Guelph, 14 head, $3.60; from Wotford, 10 head, $3.30; from Brantford, 10 head, $3.08. The car from North Toronto to Sydney (1,200 miles) was only $57.60 and the attendant was allowed return transportation at one cent per mile over the C.P.R. and I.C.R.

During the past year two partial car loads have been made up by the Associations to be forwarded to the United States, one for the state of Michigan and the other for the state of New York.

When orders are received, having lists of stock for sale, elsewhere described, the secretary can easily buy to the best advantage both for buyer and seller. No commission is ever charged, and as the railways are very liberal in the matter of transportation the expense of getting an order together is very little.

Outline of Plan for Assembling and Distributing Stock for Manitoba and the Northwest.

By the Associations taking charge of less than car load lots and assembling and making up the carloads, shippers of small lots obtain the benefit of the car load rate. These rates have been taken advantage of by breeders both in Ontario and the West, and the large number of enquiries now being received regarding rates shows that our efforts in the direction of cheaper transportation are well known among stockmen generally, and that the reduced rates at which pure bred stock can now be delivered in the West are appreciated.

In order that the cost may be as light as possible to shippers, a car is started at the farthest western point in Ontario at which stock is to be loaded and consigned to the farthest point at which unloading is to be done in the Northwest. Arrangements are made for a stop over at the necessary points for loading and unloading, stock not already on the main line being shipped to the nearest point; the car arrives at the designated places according to a timetable which is prepared, a copy of which is forwarded to each shipper. On account of the reduced rates on less than carloads lots, the local cost of shipment in order to meet the car on the main line, is comparatively light.

Local Shipments of Registered Cattle, Sheep or Swine. One matter, however, should be impressed on all shippers of pure bred stock between local points. In order to obtain the reduced rates for pure bred stock (one-half regular tariff rate) it is absolutely necessary to produce the certificate of registration for the inspection of the station agent at the shipping point. See that the name and number of each animal are entered on the shipping bill, then if the reduced rate is not allowed there will be no difficulty in obtaining a rebate. Unless this is done the railway companies will simply state that the rules governing the shipment of pure bred stock have not been complied with.

Immediately the car leaves Ontario, full particulars are sent to Mr. Robert Kerr, freight traffic manager of the C.P.R. at Winnipeg, giving the various points at which stock will be unloaded and the charges to be collected on each shipment. Upon the car reaching Winnipeg, Mr. Kerr gives the attendant in charge of the car a letter to each of the station agents at points where the stock is to be unloaded, authorizing the agent to advance the amount of our charges on the shipment to be unloaded at his station, he (the agent) to collect these charges again from the buyer before delivery of stock. The co-operation of the railway company in this respect has been of great service to us, as some parties to whom stock is to be delivered cannot be at the station, not knowing exactly when the car will arrive and living perhaps twenty or thirty miles off the railway. If this system were not employed it would necessitate the car stopping over at each point two or three days in order to deliver the stock and collect the charges. As it is now, stock is given in charge of the station agent, the charges collected, and the car goes forward on the same train; from one week to ten days' time is saved in this way. Stock to be delivered at some point not on the main line of the C.P.R. in Manitoba or the Northwest is re-shipped from the nearest junction point on the main line, at the reduced rates given hereafter. As the re-shipping is done by the attendant in charge of the car a stop over until the next train is necessary. Our charges to the junction point on stock to be re-shipped are advanced by the station agent and the amount collected at the destination together with the charges for transportation from the junction point to the destination.

From the above outline of the plan followed, it will be seen that a large amount of detail work is necessitated, and it is necessary that the attendant, as well as being capable of caring for stock and accurately following out instructions, must also be one who is thoroughly reliable as the collections amount, in each shipment, to quite a large sum. If the car sent out were an ordinary car load from one point in Ontario to one destination

there would be no difficulty in obtaining any number of capable men to take charge of the car in order to obtain free transportation. With the conditions as they at present are, however, it has been found much more satisfactory to engage a suitable man, pay him for his time, and furnish him with return transportation to Ontario. This extra cost has been objected to as unnecessary, but it cannot be satisfactorily done in any other way. The secretary-treasurer, who is responsible for the safe keeping of the funds of the Associations, cannot be expected to allow a man that may be, and no doubt is, perfectly reliable to make collections for the Associations unless he knows for himself that the man is reliable or unless some reliable person known to the secretary agrees to go security for the said person. Shippers will sometimes state that they have had stock delivered at some point in the west for a less amount than the Associations can agree to transport same for. This may be quite true. A breeder comes to Ontario and buys perhaps twelve or thirteen head and orders a car. He has room for four or five more head and to take out a full car will not cost him one cent more than if the car is only two-thirds full. If he can arrange to take other stock besides his own he is quite willing and anxious to do so at a very low rate, as anything he receives in this way is a clear gain to him. The Association cars are not shipped until a full car load is available, and each animal is then charged an equitable proportion to the space occupied, the charges simply being high enough to cover the cost incurred Nothing whatever is made out of these shipments by anyone; they are entirely for the benefit of parties having small shipments. If shippers or buyers can have stock delivered at any cheaper rates, no one is more glad to have them do so than the officers of the Dominion Live Stock Associations; but if they cannot arrange to have the stock delivered at a less rate we are quite willing to deliver them at the rates per schedule to follow.

The publication of the above mentioned schedule has already had a very beneficial effect in aiding exporters and importers of pure bred live stock to calculate the charges from any point in Ontario to any point in Manitoba, thus enabling Eastern sellers to make exact quotations to Western buyers for stock delivered. It also has a tendency to prevent unscrupulous men from overcharging others who may send animals in cars made up by them.

The rates here given only apply from the point where stock is loaded on the Association car in Ontario to the point where the stock is unloaded in Manitoba and the Northwest. The cost of any local shipping before reaching the car or after leaving it, is extra. We have formerly been unable to give an accurate rate for transporting stock from Ontario to points in the West, the charges on the various shipments being made up after the car was loaded. This was not very satisfactory to intending buyers, as they very often wished to know before purchasing the cost of having the stock delivered, but as the system was in the experimental stage we could not do otherwise. After two years' experience the following schedule has been made out. It is possible that after these rates have been tried for a short time we may be able to make a slight reduction.

The distance between Winnipeg and Calgary is divided into five sections. The rates to all points within any one section will be the same.

SCHEDULE OF RATES FOR STOCK FOR MANITOBA AND THE NORTH-WEST *via* ASSOCIATION CAR.

CATTLE.

Bulls.

Age.	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.
	$ c.	$ c.	$ c.	$ c.	$ c.
Under 6 mos	8 00	8 50	9 00	9 50	10 00
Over 6 mos. and up to 12 mos	10 00	10 75	11 50	12 25	13 00
" 12 mos. and up to 18 mos	11 00	12 00	13 00	14 00	15 00
" 18 mos. and up to 24 mos	12 00	13 25	14 50	15 75	17 00
" 24 mos	15 00	16 25	17 50	18 75	20 00

Cows and Heifers.

Age.	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.
	$ c.	$ c.	$ c.	$ c.	$ c.
Under 6 mos	8 00	8 50	9 00	9 50	10 00
Over 6 mos. and up to 12 mos	10 00	10 75	11 50	12 25	13 00
" 12 mos. and up to 24 mos	11 00	12 00	13 00	14 00	15 00
" 24 mos	12 00	13 00	14 00	15 00	16 00

HORSES.

Stallions.—10 per cent. more than bulls.

Mares.—10 per cent. more than cows and heifers.

PIGS.

(*Must be Crated in all Cases.*)

Weight (including crate).	Sec. 1.	Sec 2.	Sec. 3.	Sec. 4.	Sec, 5.
	$ c.	$ c.	$ c.	$ c.	$ c.
Under 50 lbs.	3 00	3 50	4 00	4 50	5 00
Over 50 lbs. and up to 100 lbs	6 00	6 75	7 50	8 25	9 00
" 100 lbs. and up to 150 lbs	7 00	8 00	9 00	10 00	11 00
" 150 lbs. and up to 200 lbs	8 00	9 00	10 00	11 00	12 00
" 200 lbs	12 00	13 25	14 50	15 75	17 00

SHEEP.

(*3 Sheep or Under Must be Crated.*)

Weight (including crate).	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.
	$ c.	$ c.	$ c.	$ c.	$ c.
Under 100 lbs	7 00	8 00	9 00	10 00	11 00
Over 100 lbs	8 00	9 00	10 00	11 00	12 00

When over three sheep from one shipper to one consignee, will be placed in car without being crated.

Weight.	Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.
	$ c.	$ c.	$ c.	$ c.	$ c.
Under 100 lbs	4 00	4 25	4 50	4 75	5 00
Over 100 lbs	5 00	5 25	5 50	5 75	6 00

In addition to the above, stop-over charges ($3 for the first stop and $2 for each subsequent stop), will be charged against the shipment for which the stop is required. When more than lot of stock is loaded or unloaded at any one point the stop over charge shall be equally divided. The above charges include transportation, care and feed while in the Association car.

Due care will be exercised and the best attention given stock, but the shipments are entirely at the owner's risk.

Alphabetical List of Stations.

Following is a list of Stations between Winnipeg and Calgary, giving the number of the Section in which each station is situated :

Station.	Section.
Aikens	3
Air Line Junction	1
Alexander	1
Antelope	4
Austin	1
Bagot	1
Balgonie	3
Bantry	5
Bassano	5
Belle Plains	3
Bergen	1
Boharm	3
Bowell	4
Brandon	1
Broadview	2
Burnside	1
Burrows	2
Calgary	5
Calgary Junction	5
Carberry	1
Carmichael	4
Caron	3
Cassils	5
Chaplin	3
Chater	1
Cheadle	5
Cluny	5
Colley	4
Crane Lake	4
Crowfoot	5
Douglas	1
Dunmore	4
Dunmore Junction	4
Elkhorn	2
Ernfield	3
Fleming	2
Forres	4
Gleichen	5
Goose Lake	4
Grand Coulee	3
Grenfell	2
Griswold	1
Gull Lake	4
Hargrave	2
Herbert	3
High Bluff	1
Indian Head	2
Irvine	4
Kemnay	1
Kincorth	4
Kininvie	5
Langdon	5
Langevin	5
Lathom	5
Leven	4
McGregor	1
McLean	2
Maple Creek	4
Marquette	1
Meadows	1
Medicine Hat	4
Melbourne	1
Moose Jaw	3
Moosomin	2
Morse	3
Mortlach	3
Namaka	5
Oak Lake	1
Oakshela	2
Parkbeg	3
Pasque	3
Pense	3
Perceval	2
Pilot Butte	3
Poplar Point	1
Portage La Prairie	1
Qu'Apelle	2
Reaburn	1
Red Jacket	2
Regina	3
Rosser	1
Routledge	2
Rush Lake	3
Secratan	3
Sewell	1
Shepard	5
Sidewood	4
Sidney	1
Sintaluta	2
Southesk	5
Stair	4
Strathmore	5
Suffield	5
Summerberry	2
Swift Current	4
Tilley	5
Tompkins	4
Virden	2
Waldbeck	3
Walsh	4
Wapella	2
Whitewood	2
Winnipeg	1
Wolesley	2

The following form has been prepared and will be forwarded to intending shippers upon application. The object is to obtain accurate information as to the shipment, also to bind shippers to pay for space in the car arrangrd for. This has been found necessary on account of parties ordering space in a car ; then, after a car is partially loaded, it is found that two or three animals have been shipped in some other way. This has caused the charges for the stock included in the car to be higher than would have been the case had the car been filled, or else the car must be forwarded at a loss, as was the case on two occasions last year.

Form.

Dear Sir,—Kindly reserve space for the stock named hereafter, in the next car load of thoroughbred stock for Manitoba and the Northwest Territories, to be shipped under the auspices of the Dominion Live Stock Associations :

Cattle. Number————. Male or female————. Age (in months if under 24 months)————. Breed————.

Sheep. Number————. Male or female————. Weight (including crates)* ————. Breed————.

Swine. Number————. Male or female————. Weight (including crate) ————. Breed————.

Horses. Number————. Male or female————. Age (in months if under 24 months)————. Breed————.

The above stock is to be delivered to Mr.————, P.O.————. Railway station————.

*Over three sheep will be loaded without being crated.

I hereby agree to pay for space for stock as above unless my notice cancelling same is received by the secretary of the Live Stock Associations before final notices regarding shipping are mailed by the secretary of the said Associations.

(Sgd)———————————————.

Comparison of Rates.

In order that a comparison may be made between the rates at which stock can be delivered in less than car load lots to Winnipeg, Moose Jaw and Calgary via the Association car and singly, the following has been prepared :

	From Toronto To Winnipeg.		From Toronto To Moose Jaw.		From Toronto To Calgary.	
	Assoc. Car.	Singly.*	Assoc. Car.	Singly.	Assoc. Car.	Singly.
Bull under 6 mos.... ...	8.00	18.10	9.00	29 30	10.00	35.50
Bull over 6 mos. and up to 12 mos..	10 00	18.10	11.25	29.30	13.00	35.50
Bull over 12 mos. and up to 18 mos.	11.00	54.30	13.00	87.90	15.00	106.50
Bull over 18 mos. and up to 24 mos.....	12.00	54 30	14.50	87.90	17.00	106.50
Bull over 24 mos.....	15.00	72.40	17.50	117.20	20.00	141.20

*Singly here means otherwise than as part of a car of pure bred stock or settlers' effects.

In addition to the above charges when shipping singly it is also necessary to send an attendant in charge of the stock.

There are corresponding differences in the rates on horses, sheep and pigs, shipped in the Association car and singly.

Freight Rates.

Following are the freight rates on pure bred cattle, sheep and swine between local points east of Fort William :

Registered cattle, sheep and swine may be shipped at one half regular tariff rates between points on the Grand Trunk railway system and the lines of the Canadian Pacific Railway east of Fort William. Registration certificates must in all cases be produced for the inspection of the station agent at the shipping point. Pedigreed stock, as above, may be taken without men in charge provided owners sign the usual contract releasing the company from liability in consequence thereof. The above special rates will only apply when owners sign the usual valuation agreement for ordinary stock and the following estimated weights will apply :

Bulls, under one year	1,000 lbs. each.
Bulls, one year and under two.....	3,000 lbs. each.
Bulls, over two years..	4,000 lbs. each.
Cattle or horned animals :—	
One animal	2,000 lbs.
Two animals.....	3,500 lbs.
Three animals	5,000 lbs.
Each additional animal in same car...	1,000 lbs.
Calves :—	
Under six months old.....	500 lbs.
Over six months and under one year	1,000 lbs.
Cow and calf under six months old, together	2,500 lbs.
Colts, under six months old.	1,000 lbs.
Hogs, sheep, lambs, or other small animals, in boxes or crates..	actual weight.

If extra values are declared weights and rates will be according to special classification.

Refer C.P.R. agents to circular No. 119 (or subsequent issue) signed G. M. Bosworth, issued February 1st, 1899; G.T.R. agents to circular No. 353, signed J. W. Loud, issued February 14th, 1899

The following comparison will show the difference between the former local rates and the reduced rates on registered stock. The rate from Toronto to Montreal in less than car load lots is fifty cents per hundred.

Toronto to Montreal.	Former rates.	Reduced rates.
Bull under one year	$ 5 00	$ 2 50
Bull one year and under two	15 00	7 50
Bull over two years	20 00	10 00
Cows	10 00	5 00
Cow and calf	12 50	6 25
Stallion	20 00	20 00
Mare	10 00	10 00
Sheep (crated weighing 200 lbs)	2 00	1 00
Hog (crated weight 250 lbs.)	2 50	1 25

It is not necessary to send an attendant in charge.

Stock to and from Ontario Exhibitions.

A large number of enquiries have been received asking if pure bred live stock shipped to exhibitions in less than car load lots are entitled to the half-rate for registered stock as well as being entitled to the free return of unsold exhibits.

The railway companies have concluded that this arrangement cannot be applied in the case of pure bred stock shipped to exhibitions in Ontario or Quebec, and that the following arrangement must govern, viz. :

Shipments forwarded to exhibitions (specially referred to in circulars issued from time to time) must be charged at full tariff rates, and if re-shipped without change of ownership within ten days after the close of the exhibition will be returned free of charge from the point of exhibition to the station or junction point from which they were originally forwarded. If exhibited at more than one fair before being returned to the original shipping station, and having paid full tariff rates to the first point of exhibition, they will be carried thence to each subsequent exhibition at one-half tariff rates in each case, and will be returned free from the last exhibition, as explained in the first portion hereof.

Releases must be executed relieving the company of liability on the return journey in consideration of free transportation.

Men in charge of live stock will be passed free both going to and returning from the exhibition with car loads only.

Northwest Freight Rates.

The following are the freight rates on pure bred cattle, sheep and swine in car load lots from any point in Ontario to any point in Manitoba and the Canadian Northwest :

The officials of the Canadian Pacific railway and the Grand Trunk railway have agreed to carry pure bred cattle, sheep and swine, in car loads, from any point in Ontario and Quebec, west of Montreal, at the rate charged on settlers' effects. The charge for a car load of pure bred stock from any point in Ontario to any point in Manitoba and westward may be learned from any agent of the C.P.R. or G.T.R., and is published in "Tariff F. T. No 45, Canadian Pacific Railway Special Through Westbound Tariff on Settlers' Effects." The rate for a car load of 20,000 pounds from any point in Ontario or Quebec, west of Montreal, to Winnipeg is $72 per car load; to Regina, $90 : to Calgary, $114 ; and corresponding rates to all western points. The rates for unregistered stock are—to Winnipeg, $130 ; to Regina, $164 ; and to Calgary, $202 ; these latter rates were formerly the rates on registered stock also. When wishing to obtain the reduced rates refer C.P.R. agents to circular No. 41, issued March 19th, 1897, signed G. M. Bosworth ; G. T. R. agents to circular No. 357, dated February 28th, 1899, issued by J. W. Loud.

Mixed car loads may be shipped at the above reduced rates. The officials of the C P. R. have recently granted the following additional concessions to shippers of pure bred live stock to Manitoba and the Northwest : A mixed car load of pure bred live stock (including not more than 10 head) and settlers' effects may now be carried at the above reduced rates provided that the goods are for a *bona fide* settler who is going to Manitoba or the Northwest for the purpose of taking up land and farming thereon. To obtain thi privilege special arrangements must be made; this can be done by corresponding with the secretary.

Settlers' effects, within the meaning of this tariff, may be made up of the following described property for the benefit of the actual settlers, viz. : Household goods and personal property (second hand); wagons, or other vehicles for personal use (second hand); farm machinery, implements and tools (all second hand); lumber and shingles, which must not exceed 2,500 feet in all, or the equivalent thereof; or in lieu of, not in addition to the lumber and shingles, a portable house may be shipped; seed grain; small quantity of trees or shrubbery; small lot live poultry or pet animals; and sufficient feed for the live stock while on the journey. All, or any of these goods may form part of a car load if shipped in accordance with these conditions; the remainder of the car may be filled with pure bred live stock.

Under the arrangement it is not necessary to load all the animals comprising a car load at one point, i.e, part of a car may be loaded at London, part at Woodstock, part at Toronto, or at any other stations on the direct line between the starting point and the destination of the car. No additional charge will be made for a car so loaded except shunting charges, which are $3 for the first stop and $2 for each subsequent stop. The same stopping privileges have been granted for unloading.

One man will be passed free with each car load, and he will be returned from the destination of the car to the original point of shipment at one cent per mile, second class. All animals sent at the above rates must be pure bred and shipped for breeding purposes only; and a certificate of registration for each animal must be presented to the agent at the shipping point. After being examined by the agent, each certificate will be returned to the shipper.

Reduced Rates for Shipment of Thoroughbred Stock Between Points West of Lake Superior.

Thoroughbred cattle, sheep and swine will be carried in less than car load lots at 50% less than the published tariff rates between stations on the Canadian Pacific Railway lines west of lake Superior, Manitoba and the Northwestern Railway, and the Great Northwestern Central Railway. The owner or agent will be carried in charge on the same terms and conditions as prevail in the handling of ordinary stock. Refer C. P. R. agents to C. P. R. circular No. 842, signed Robert Kerr; M. & N. W. R. agents to M. & N. W. R. circular No. 189, signed A. McDonald; G. N. W. C. R. agents to G N.W.C.R. circular No. 58, signed H. F. Forest. These circulars were issued May 1st, 1896.

Rates from Ontario to Exhibitions in Manitoba and the West.

The C. P. R. will carry animals from Ontario to the Northwest for exhibition purposes at the reduced rate per carload, and will return the same at one half the going rate. For instance, a shipment to Winnipeg would be charged $72. If returned to the original point of shipment the rate would be $36 in addition to the $72, total $108, from any point in Ontario and Quebec west of Montreal to Winnipeg and return. Corresponding rates to other points. An attendant will be carried free with each car load.

Agreement with the Government of the Northwest Territories.

After a lengthy correspondence had passed between myself and the Government of the Northwest Territories regarding the transportation of pure bred stock to that district at a reduced rate, it was concluded that suitable arrangements could not be made at such a

distance. So great a time elapsed between writing a letter and receiving a reply that it was decided that it would either be necessary to drop the matter altogether or arrangements be made by means of personal interviews. As I was unable to go to Regina at the time the Legislature of the Northwest was in session, my assistant, Mr. Westervelt, was sent in my place; as a result the following arrangements were made.

A thoroughbred bull will be delivered from any point in Ontario to any point in the Northwest Territories for the sum of five dollars, upon the conditions hereafter being complied with :—

I. The bull must be thoroughbred and for a *bona fide* settler in the Northwest Territories.

II. A declaration from the breeder or seller must be signed and filed with the Deputy Commissioner of Agriculture at Regina; this declaration must state to whom the bull was sold and give the name of the bull, and the name and number of the sire and dam.

III. A declaration from the purchaser must be signed and filed with the Deputy Commissioner of Agriculture at Regina; this declaration must state that the buyer is a *bona fide* settler of the Northwest Territories engaged in the business of stock breeding, and the owner of, or has an interest in a number of breeding cows; also that the bull is for service in the herd and neither directly nor indirectly for immediate barter or sale.

IV. The sum of five dollars must be deposited with the Deputy Commissioner of Agriculture at Regina.

V. One shipment of stock will be made up the last of April or early in May. Only stock included in this shipment will be entitled to the reduced rate.

The last clause may seem rather stringent, but on the western ranches they wish none but spring calves, that they may be as strong as possible before the cold weather sets in. They therefore do not wish to import bulls at any other time than in the spring. It is expected that a train load will be made up at that time and placed in charge of settlers going out to take up land.

Although the number mentioned above is limited to one bull for any one settler, it is possible this may not be strictly enforced. It will depend altogether on how the appropriation for this service lasts. The appropriation will be used up, and if there is more than sufficient to pay the bonus on one bull, the number allowed any one settler will be increased or perhaps extended to females.

The appropriation consists of $2,000 voted at the last session of the Northwest Legislature, and out of this amount will be paid all expenses of shipping each animal over and above the sum of five dollars.

All arrangements regarding shipping and assembling in Ontario will be taken charge of by the Dominon Live Stock Associations.

Rates to British Columbia.

The rate on a carload of registered stock to British Columbia has been reduced by about $60, as the following correspondence will explain :

Toronto, Jan. 21st, 1899.

G. M. Bosworth, Esq.,
Freight Traffic Manager, C. P. R.,
Montreal, Quebec.

Dear Sir,—Under date of November 22nd, 1897, you quoted me a rate to New Westminster, B.C., on a carload of pure bred stock of $251. The rate on a carload of pure bred stock according to your circular No. 41 of March 19th, 1897, to Lytton, B.C., is $138. The rate on a carload of stock from Lytton B.C., is I understand $58. Should the rate on a carload of pure bred stock from Ontario to New Westminster exceed $196, the rate on a carload of thoroughbred stock to Lytton and a shipment of an ordinary carload from Lytton to New Westminster?

(Sgd.) F. W. HODSON.

(Reply)

Montreal, Jan'y 23rd, 1899.

Dear Sir,—Your letter of the 21st inst. received. It is no doubt true that the rate on pure bred stock to Lytton, plus the local rate from Lytton to New Westminster, will make a lower through rate than I quoted you, and I presume that you would be entitled to the rate you mention.

If you have any pure bred stock for New Westminster I will make you a through rate of $196 per car if advised before shipment.

(Sgd.) G. M. BOSWORTH.

MONTHLY LIST OF STOCK FOR SALE.

A short review of the history and work of the *Ontario Agricultural Gazette* will enable you to come to a conclusion as to whether work in this direction should be increased or lessened. The object of the publication is to assist members of the Association to sell their stock. The question that arises is, has it been successful in attaining this object, and if so, is it capable of still greater usefulness by further development? These questions should be kept in view.

In my annual report in March, 1897, the following was a clause: "It has been the practice of each Association to publish in the annual report each year the name and address of each member and specify the breed he reared. This has grown to be the largest Breeders' Directory in Canada. During the last three years I have been frequently asked for these lists by parties desiring to buy pure bred stock and have mailed hundreds of copies, sending them to various parts of Canada and the United States. I believe that if these lists of breeders could be revised and distributed monthly it would be of great value." It was decided at the annual meeting to place the matter in the hands of the executive. At a meeting of the executive in June of the same year, the matter was brought up and was strongly opposed by some on the ground that the funds belonging to the Associations should not be used for this purpose. It was decided after a fair discussion that the Associations were organized for the benefit of the live stock trade, and that the officers were fully entitled to formulate and carry into effect any plan considered by the Associations to be for the benefit of the country at large, but in order that there be no ground whatever for taking objection, it was decided that the amount spent should not exceed the membership fees of the various Associations. As there was still considerable opposition, it was decided to again place the matter before the executive committee of the Live Stock Associations. This was done in the Association tent at Toronto Industrial Exhibition in the fall of 1897, when the decision of the former meeting was sustained, and the Secretary was instructed to make the best terms possible regarding the publication. This was done and the first list of stock for sale was published in "Farming" on October the 12th, 1897. Since that time the list has appeared monthly.

One direct advantage which is especially noticeable is the fact that the membership for the Cattle and Sheep Breeders' Associations is kept up to the number required by the Government, without special effort being made. Previously it was necessary each year to canvass and solicit the breeders in order to obtain the required number. The membership of the Swine Breeders' Association, while always being well above the required number has increased during the past year nearly one hundred.

In addition notices of meetings, notices regarding the Fat Stock Show, and reports of meetings were published, and it was chiefly through the notices regarding the Association cars of stock for the west, that the cars were made possible. It is by means of this list of stock that I am able to locate stock when requested to do so by intending purchasers, and it is the persons who are there advertised who have the first opportunity to sell; and who will sell if their stock is suited to the requirements of the purchaser. During the past year I have received more inquiries than ever before as to where certain breeds of stock can be found, and my only guide is the list of stock for sale.

Towards the end of last year stock throughout the Province was very scarce, and the interprovincial trade was very large. Should not the *Gazette*, which is being received by breeders throughout Canada, be entitled to a fair share of the credit? It is impossible to make any accurate statement as to the work done by the *Gazette* in making sales, but the opinion of the large number of prominent live stock men who have sent unsolicited testimonials, is evidence as to the work being done through this medium. I will quote only one:

"Your advertisement of stock for sale in the "Gazette" is a very happy one, and must be very useful to buyers.

(Sgd) Sydney Fisher,
Minister of Agriculture.

The result of the publication of the lists may be summed up as follows:

1. The increase in interprovincial trade.
2. The increased membership of the Associations.

The cost of the *Gazette* to each Association during the past year was $69.70. Has value been received for this expenditure?

REGISTRATIONS.

Three years ago the Dominion Swine Breeders' Association took complete control of the swine records, and arrangements were made by the Executive whereby the Association paid to the recording secretary twenty-five cents for each registration certificate issued and ten cents for each transfer. Mr. Henry Wade was appointed recording secretary for the Association. Before January, 1896, the swine records were in the hands of the Agriculture and Arts Association—the Swine Association receiving nothing from the records and about fifty or sixty cents from the membership fees, the balance—$1.40 or $1.50—going to pay for the volumes of the record supplied to members. All we received addition to the Legislative grant was between $100 and $150 from membership fees

Since January 1896, when the records were taken charge of by the Association, in addition to paying the recording secretary $2,511.80 for issuing registration certificates and transfers, we have received $2,702.90 on account of registrations, and $1,760 on account of membership fees, or a total of $4,462.90. Out of this sum we paid for two volumes of the record issued, $1,288, leaving a balance for the three years of $3,174 90 against the $450 (an outside limit) which we formerly received from membership fees. In other words under the existing arrangements we are $2,724 90 better off than we would have been had the old arrangements still been in force. Against this sum, however, may properly be charged about $700 for printing the volume of the record which will contain pedigrees already issued by the recording secretary but not published. Deducting this amount will leave in round figures $2,000 more to the credit of the Association than we would have had under former arrangements.

This I think is a good showing for three years' work, and your Executive justly feel that their work was well done and in the interest of the Association.

Following is a statement showing the number of swine published yearly in each volume of the Swine Record since 1891 when the first volume was issued. In the first volume were printed registrations received as early as 1876 :

NUMBER OF EACH BREED RECORDED YEARLY.

Breed.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	Certificat's issued in 1898.
Berkshires	1,389	1,100	1,300	1,500	1,150	1,025	1,287	1,491	1,273
Yorkshires	494	498	500	900	859	821	460	718	1,0 4
Suffolks	200	121		64		44	32		10
Chester Whites	249	250	200	200	96	358	184	415	442
Poland Chinas	200	250	720	170	92	296	237	330	233
Tamworths		76	160	91	333	248	193	427	817
Duroc-Jerseys					81	152	69	208	151
Essex							43		17
Victorias									6

It will be noticed there are two columns for 1898—one column for the pedigrees published in 1898, the other for registration certificates issued in 1898. The pedigrees of animals recorded in 1898 will not be published until the end of this year. In this connection it might be well to consider whether some change should not be made so that the volume issued at the end of each year would contain pedigrees issued during that year, and not those issued during the preceding year. For example volume No. VIII, lately published, contains pedigrees issued in 1897. If two volumes were issued this year we would then have the pedigrees issued right up to date; that is, all certificates received during 1899 would be published at the end of this year and the volume would be sent to all who had been members for 1899, they thus receiving the volume in which the pedigrees of their stock was recorded. The extra cost to the Association would be $150.

Taking the number of pedigrees published in each volume as a basis, the following table will show the amount of fees received from the registration of each breed. The computation has been made at the rate of fifty cents per registration, although a few animals will have been recorded for non-members, for which $1 00 was paid.

Breed.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	——
Berkshires	699 00	550 00	650 00	750 00	575 00	512 50	643 50	745 50	636 50
Yorkshires	247 00	249 00	250 00	450 00	429 50	410 50	230 00	359 00	522 00
Suffolks	100 00	60 50	.....	32 00	....	22 00	16 00	.....	5 00
Chester Whites	124 50	125 00	100 00	100 00	48 00	179 00	92 00	207 50	221 00
Poland Chinas	100 00	125 00	360 00	85 00	46 00	148 00	118 50	165 00	116 50
Tamworths	.....	38 00	80 00	45 50	166 50	124 00	96 50	213 50	408 50
Duroc Jerseys	.....	.....	.....	.....	40 50	76 00	34 50	104 00	75 50
Essex	.....	.....	.....	.....	.....	.....	21 50	....	8 50
Victorias	.....	.....	.....	.....	.....	.....	.....	.....	3 00

The totals for each breed are as follows :

Berkshires	$5,762 00	Tamworths	$1,172 50
Yorkshires	3,147 00	Duroc Jerseys	330 50
Suffolks	235 50	Essex	30 00
Chester Whites	1,197 00	Victorias	3 00
Poland Chinas	1,264 00		

GROWTH AND MEMBERSHIP.

The membership of each of the Associations was larger in 1898 than in the previous year, and in the case of the Cattle and Swine Breeders' Associations was larger by at least 30 per cent., and this without special endeavors being made to obtain members. This indicates that the Associations are in a healthy, growing condition and that the growth is not due to special influences.

The following comparative statement shows the receipts and membership of each of the Associations each year since organization.

Cattle.

——	1894.	1895-6.	1897.	1898.
Receipts	.....	$1,642 13	$1,577 24	$1,599 00
Membership	.....	84	75	99

Sheep

——	1889-90.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.
Receipts	$303 00	$424 00	$361 00	$768 00	$1,059 50	$1,060 00	$1,619 13	$1,596 83	$1,594 00
Membership ..	53	94	61	68	78	96	61	93	94

Swine

——	1890-91.	1892	1893.	1894.	1895.	1896.	1897.	1898.
Receipts	$340 00	$662 35	$1,124 00	$1,496 00	$1,355 89	$2,376 88	$2,721 06	$3,031 55
Membership.....	40	170	212	295	244	240	271	369

PROVINCIAL WINTER FAIR.

The Provincial Fat Stock and Dairy Show held in Brantford last year was very successful. A full report of the prize winners is published elsewhere in this report. The following comparative statement of entries, etc., since 1891, will show the growth of what is now the largest show of its kind on the continent:

Date.	Show held at	No. of entries.	Entry fees.	Gate receipts.	Total amount of premiums paid.	Show held under management of
			$ c.	$ c.	$ c	
1891..	Guelph	81	120 50	68 75	325 00	Guelph Fat Stock Club and Agricul ture and Arts Association.
1898.	Brantford ..	*760	661 75	545 55	†4,378 00	

Following is a list showing the number of each breed entered for exhibition at the show in 1898:

FAT CATTLE:

Shorthorns	18
Herefords	1
Polled Angus	10
Galloways	16
Devons	3
Grades	31
Total	76

SHEEP:

Cotswolds	25
Lincolns	25
Leicesters	26
Oxfords	24
Shropshires	40
Southdowns	40
Dorset Horns	15
Merinos	.
Hampshires	1
Suffolks	8
Grades	41
Total	243

SWINE:

Imp. Berkshire	25
Imp. Yorkshires	41
Chester Whites	24
Poland Chinas	27
Suffolks and Essex	16
Tamworths	32
Duroc Jersey	40
Grades	96
Total	301

DAIRY:

Shorthorns	4
Ayrshires	10
Holsteins	8
Jerseys	8
Guernseys	3
Grades	8
Total	41
Total in all departments	671

*No entries were required for special prizes this year, as has been the case previously. About 25 entries were refused on account of not being received in time.

† In addition to this amount a number of special prizes consisting of farm implements were donated.

SUGGESTIONS.

The great difficulty in obtaining acceptable judges to act at the Provincial Winter Show has been a menace to the success of the Show since its inception. We have a great many competent and honorable judges of pure bred live stock in Ontario, but all the men capable of judging are breeders, and either wish to exhibit themselves, or some of the parties to whom they have sold are exhibitors. This in the case of an honorable man should be no objection. I believe there are many members of the Live Stock Associations who are competent, honorable and capable of judging stock even if their own animals are in the ring, and although they may do their work very well they are bound to incur adverse criticism when judging their own animals or the animals of their customers. Therefore, I believe it best, if possible, to obtain the services of competent foreigners, men who can have no interest in and little knowledge of the breeders of this country. Such men are available, and their services can be made valuable in other respects. Men thus brought from a distance can be used to address our public meetings, and will be drawing cards when so employed. Still, we will find it necessary and best to employ Canadian judges in some classes, especially in the swine department. Here our breeders are so far in advance of the Americans that it would be unwise to employ American judges. We are striving to breed one type of hog; the American is breeding another. We are catering to the best bacon markets in England; therefore we must employ judges at our Fat Stock Show who know the requirements of the trade. I believe it will be wisest and best in every case to employ one breeder and one butcher or exporter. Animals, according to our rules, are to be awarded premiums according to their value from a consumer's point of view. The time is past when the fattest animal should be awarded the first prize at our Provincial Winter Show. We have got beyond that stage and have arrived at a better and higher place in the production of animal products. If the officers of the Provincial Winter Show do not recognize this fact and do all in their power to instruct and encourage the public to produce the sort of animals that are required by the markets of to-day, then there is no excuse for the continued existence of our Show. We must hold an up-to-date exhibition, and it must be of an educational character. Because of the season at which it is held it is not possible to make it a money making concern as is Toronto, Ottawa and London, but for practical educational purposes it should far outstrip any of these great exhibitions. I believe to-day it is the foremost educational fair in America. It is our duty to make it better and more valuable to the country each year. In this connection I will here give extracts from letters written by prominent Americans and Canadians dealing with the Ontario Provincial Winter Fair:

AMES, IOWA, December 15th, 1898.

DEAR SIR,—I returned Saturday morning from my trip to Canada. My visit among your stockmen and agriculturists was highly enjoyed and instructive. I was particularly impressed with your Fat Stock Shows, and your system of Government aid and direction of this work for the benefit of the live stock industry. I have no hesitation in saying that I believe that this is the best and most efficient work of the kind that is being done under the auspices of any Government. The Fat Stock Shows are particularly adapted to serve the purpose of education and furnish object lessons of the most practical and useful sort. There is no place where the breeder can study breed characteristics and type of the finished animal in its highest degree of excellence with as much satisfaction and profit as in the Fat Stock Show contests.

The discussion of the essential qualities of the highest type of bacon hogs, for instance, by the breeders and packers, with both the live animals and the dressed carcases before them for demonstration, afforded the most practical and useful work of this kind that I have ever seen in connection with live stock exhibitions, and it cannot fail to re-bound to the benefit of Canada's bacon producing industry. If the lessons of that discussion alone were fully understood, it would mean a saving of millions of dollars annually to the pork packers of your country.

It also occurs to me that for the same reason you should have a slaughter and block contest in the cattle and sheep departments of your show as well, in order that the breeders may receive the full benefit of the lessons to be derived from the carcasses on the block. I believe that a show of this kind in every agricultural community would serve a most useful purpose in educating towards a higher standard and correspondingly a greater profit in all of our meat products.

Yours very truly,

(Signed) C. F. CURTISS,
Director and Professor of Agriculture,
Iowa Agricultural College.

MADISON, WIS., December 28th, 1898.

DEAR SIR,—For the past fifteen years I have been very well acquainted with Ontario's leading stockmen, and have been well aware that no part of the American continent contained a higher percentage of first class farmers and stock breeders than does Ontario. Since visiting your show at Brantford I am led to say that nowhere can a better exhibition of finished animal product be found than at the Ontario fat stock show. The work your associations are doing in this line is worthy of the highest commendation. It is a thoroughly practical work, and should bring great results to the agricultural interests of Canada. I only wish that our Wisconsin farmers might have seen the magnificent exhibition of sheep, swine and cattle in all the leading breeds, that were so largely in evidence at your show. We have successful fairs and live stock exhibits, but no fat stock show. It takes a fat stock show to open the eyes of the people to what can be done by the best methods of breeding and feeding.

Hoping that you will be able to continue this good work, and to add new features to it, I am,

Yours most truly,

(Signed.) GEO. MCKERROW,
Supt. Farmers' Institutes.

OTTAWA, December 23rd, 1898.

DEAR MR HODSON,—I have yours of December 21st. I was extremely gratified and much impressed with the fat stock show at Brantford. I made a particular specialty of investigating the bacon business, and felt that I learned more than I ever had in all my experience before. The intentions of the criticism of the dead carcasses as well as the live animal were excellent, and a first rate beginning was made. I would simply say that another year a very much better arrangement ought to be made of it, so that the people could see and hear properly, and the speakers could have a fair opportunity and convenience for their part of the work. I approve of your having the same kind of thing for cattle and sheep, but whether you can manage it for the cattle I do not know.

I think that an exhibit of dressed birds, of as many different breeds as are common in the country, ought to be shown also, and an explanation given of the difference between them. The poultry trade is one for which there are great opportunities of expansion, and we ought to aid it as much as possible.

I quite agree with Prof. Curtiss, who by the way, made a very favorable impression upon me.

Yours very truly,

(Signed) SYDNEY FISHER,
Minister of Agricultnre.

OTTAWA, December 26th, 1898.

DEAR SIR —I was much pleased with the Provincial Fat Stock Show at Brantford. I thought the educational value of the exhibits was great.

I recognize that your department is doing very excellent work for the live stock interests of Ontario, and you may count on the hearty co-operation of this department.

Yours faithfully,

(Signed) J. W. ROBERTSON,
Dominion Agricultural and Dairy Commissioner.

INGERSOLL, December 26th, 1898.

DEAR SIR,—We consider the results of the swine exhibit at Brantford in connection with your winter fair were very good, and such information imparted to the farmers can hardly fail to be helpful, but it must be repeated, and rubbed in so to speak. We would suggest that next year the hogs for the block test be split by a good man from some packing house, and one side of each hog made into a finished "Wiltshire." They would thus show to better advantage. They should also be hung in a line at the top so that the difference in length would be seen at a glance. It might be well if it could be arranged for the farmers to have this matter thrashed out on the fair day in some place where they could hear better than in the open show ; but the hearing is the chief point in this suggestion.

We think you have the show about perfect, and that the block tests are the very thing to show the farmers what is wanted.

Yours very truly,

(Signed) C. C. L. WILSON,
Manager Ingersoll Packing Co.

OTTAWA, December 23rd, 1898.

DEAR SIR,—It is true I had the pleasure of visiting your Fat Stock Show at Brantford this year for the first time, and would say that I was highly pleased with what I saw. You are, no doubt, making great headway, judging from your phenomenal entry now as compared with six years ago.

Yours very truly,

(Signed) E. MCMAHON,
Sec'y Central Canada Exhibition Ass'n.

ABINGDON, January 21st, 1898.

DEAR SIR —I hope to be able to attend the Sheep Breeders' meeting; we now look forward to their meeting as one of the events of the season. I am sure this Association has done a great deal for the sheep breeders of this country, more than ever was expected when you first moved to bring these Associations into existence.

Yours very truly,

(Signed) JOHN JACKSON.

DEREHAM CENTRE, January 26th, 1899.

DEAR SIR,—I am going to be at the meetings after all, for our car will not leave until February 8th, and will start from Brockville and go straight west by way of Chicago. I also want to see you, so will be able to do so now.

I think this interprovincial trade you have been advocating is well worthy consideration. There is no telling what a benefit it could be made to the breeders of Ontario. It is just about two months ago since I sent an advt. to the "Vancouver World" advertising our stock by car loads (per free delivery), and at that time not a single order had been sent to Ontario, and now we have orders for 10 head of cattle, 16 sheep 8 pigs and 2 geese, and orders coming in every day.

Yours very truly,

(Signed) WM. BUTLER & SON.

EXTRA ENTRY FOR KILLING TEST.

Last year we found that it cost 50c. per head to kill the animals over and above the expenses incurred of stabling. This being the case, would it not be wise to add 50c. extra per head for all entries in the classes where animals are to be killed? It is a question whether this will be a wise plan or not, but I leave it for the gentlemen present to consider.

BLOCK TESTS IN THE SHEEP DEPARTMENT.

Since the block tests in the Sheep Department proved to be of so great practical value, I have decided to ask you to extend the block tests to the Sheep Department. I believe that the block tests will do more to educate our people as to the requirements of the market than anything else. During the Exhibition I think men should be procured who are capable of addressing assembled audiences in a suitable place setting forth the reasons why one carcass is better than another. In these cases the carcass should be cut up, and the lecturer should point out the peculiarities and value of each out, and as far as possible explain to his audience how the best carcasses and the best cuts are produced.

SWINE EXPERIMENTS

During the past four or five years there has been a great deal of nonsense talked and written regarding the type of hog which gave the best side of export bacon, and the class of food which produced the bacon required. We are told with vehemence and great earnestness that corn will not produce first class bacon. We are also told that pigs must not be fed on clover, or at least finished on clover, if choice breakfast bacon is to be produced. We are told that the best hogs are produced by feeding milk, barley and peas. We are again told that hogs intended for the English market must not be fed milk, and so the ball goes rolling from corner to corner. I have made a careful study of this question for the past two years, and have come to the conclusion that very few persons, if any, know what they are talking about in this respect; they simply jump at conclusions. The reason that a great deal of soft bacon was marketed in June and July last year (and a great deal was marketed and bought at a very heavy loss by the packers) was because the swine were turned into the clover fields and sold from these fields without receiving enough additional grain. I am not going to venture an opinion as to how the danger of soft pork can be averted, but I suggest that experiments be conducted next year to establish certain facts, and that these experiments be carried on from year to year. I have corresponded with the railroad companies, and also with some of the large pork packing establishments of the country, and the managers write me that they are willing to co-operate with the Swine Breeders' Association in investigating these facts I have also corresponded with a number of prominent farmers throughout the country, and these, too, are willing to

co-operate with us in carrying out experiments. Prof. Day and I have talked the matter over, and have come to the conclusion that the Swine Breeders' Association in connection with the Ontario Agricultural College are the proper parties in Ontario to conduct suitable tests. Prof. Day writes me under date of January 26th, as follows:

DEAR SIR,—I have been thinking over your proposal of co-operative experiments on quality of bacon, and would make the following suggestion: It seems to me that it would be well to prepare a circular letter to send to those you believe would be willing and able to engage in the work. This letter would briefly explain the nature of the work, and give a choice of one or several experiments. The following experiments might be suggested:

Experiment No.	1.	Red clover	pasture with	corn meal.
"	2.	"	"	barley meal.
"	3.	"	"	pea meal.
"	4.	"	"	shorts.
"	5.	"	"	mixed meal.
"	6.	Alfalfa	"	corn meal
"	7.	"	"	barley meal.
"	8.	"	"	pea meal,
"	9.	"	"	shorts.
"	10.	"	"	mixed meal.

It is not likely that we could get all these tests made, but each man could make a choice of one or more of the experiments described. It would be desirable for each man to know, approximately at least, how much meal he fed per day. If he could weigh the hogs at the commencement it would increase the value of the experiment, but weighing need not be insisted upon. Where mixed meal is used the kinds and approximate proportions should be noted. When hogs are ready for marketing, the experimenter should notify the Secretary, so that arrangements can be made for shipping. It would be best for one of the Committee to make an occasional trip among the experimenters, and in this way we might know what lots might be shipped together, and probably save something in freight rates. The experimenter could be paid highest current price for his hogs, and probably a trifle more for any extra trouble entailed. If we could get a large number of hogs in one locality the cost might be made comparatively small. However, an appropriation would be necessary for the purpose, and I must leave it with you to obtain that.

If you have any further suggestions to add I shall be pleased to discuss the matter with you, and will be willing to aid in the work to the best of my ability.

Very truly yours,

(Signed) G. E. DAY.

The experiments here suggested may not be all that are required, but we concluded before going further with this question to lay the matter before the directors of the Association, and if you think it wise that these experiments be gone on with we will ask you to appoint a committee and instruct us what you desire us to do. I believe suitable experiments can be conducted at a very small expense to the Association. My suggestion is that men be employed in different parts of the country to feed pigs in a certain way. This can be done by agreeing to take the pigs when finished off their hands at the highest market price whether too fat or too thin as long as they are fed according to the plan laid down by one or other of these tabulated experiments. As I said before the pork packers' establishments will co-operate with us and I think an extended list of experiments can be carried on with very little cost to the Association. I think $200 or $300 and perhaps far less will answer the purpose for the first year. When the animals are finished they can be shipped into the packing house and killed and a careful record made of their value when dressed. They can then be put in the salt and finished for the English market, and a record taken just before they are shipped of the quality of the meat. These can be published broadcast throughout the country, and a copy of the report sent to each member of the Swine Breeders' Association. In this way reliable and desirable information will be scattered throughout the country. The funds of the Swine Breeders' Associaton will allow this to be done. In fact I think experiments can be conducted from year to year at a very small cost to this Association, and I am emphatically in favor of going on with them.

PASSENGER RATES TO THE SHOW.

A serious difficulty which I as Secretary have had to contend with from year to year is the undesirable passenger rates given by the railroad companies to those attending the show. It is the custom of the great railroad corporations to grant the visitors of many

of the central shows and many of the county shows tickets at reduced rates. These reduced rates are as good as single rates in many cases, sometimes better. I have tried in vain to obtain this privilege for our show, the greatest agricultural educational exhibition in America, but the railway companies have steadfastly refused to give us anything better than the standard certificate plan. We therefore have to sign hundreds of certificates each year. This adds largely to the trouble and considerably to the expense of conducting the show. What we want is single rates from points in Ontario to this exhibition, and there is no reason why we should not receive them. This is given to all conventions where 300 or more persons attend. Last year nearly 700 certificates were signed by us; the year before something over 600. The railroads by granting us single fare to this exhibition would relieve us of a great deal of extra correspondence and work, and single rates would largely increase the attendance at the show, for a great many farmers will not be bothered with a convention certificate, and one-fourth or perhaps more of the agents of the railroad companies in country places either do not know how to issue a standard certificate or will not go to the trouble to do it. I am continually receiving complaints from intending visitors to the show in which they state that the railroad agent will not or cannot issue a standard certificate, therefore they conclude not to attend the exhibition. It certainly is in the interest of the great railroad corporations to do all in their power to forward the interests of the agricultural exhibitions and farmers' associations. It is largely in their interests that the agricultural products grow better and better each year, and entirely in their interests that the export and local trade increase, therefore we think we have an exceedingly good plea to go to them with and ask for a single passenger rate to and from the Ontario Provincial Winter Fair.

INTERPROVINCIAL TRADE.

The publication of the Ontario Agricultural Gazette, the extension of interprovincial trade, and the continuation of the reduced railroads rates are three questions that are inseparably connected. During the past year I have gone to no extra trouble to enlarge the list of stock for sale by the members or obtain the list of stock that the breeders had for sale; I simply took what was sent in. I have asked no man during the year to join one or other of the live stock associations, but have allowed the membership to drift. I did not do this through carelessness nor without a purpose in view. I wanted to see just what effect the publication of the lists of stock for sale would have, and I am bound to say it has been of great benefit. Nothing the associations have ever done has proved of such a benefit to the country at large, as the publication of these lists of stock for sale. Nothing has appealed so strongly, and has been commented upon so favourably by foreign observers and public men in the Dominion, as the publication of this list and our struggle for reduced rates for pure bred stock on the great trunk lines of Canada. A leading writer in one of the great English papers of the day said that so great and beneficial a scheme as the one floated by the Provincial Live Stock Associations has never yet been conceived by public men in Britain for the benefit of agriculturists. Public men all over the Dominion speak in the highest praise of the work accomplished by our associations in this direction. I firmly believe that if I had urged men to join our associations, and send in lists of stock for sale, as has been done in previous years, our membership would have been phenomenal to-day, but I wished to see what the lists of stock for sale would do for our associations by way of increasing the membership without pushing either the lists or the membership. The results have been exceedingly good, the membership of each association is larger than ever before, and enquiries for lists of stock for sale are very numerous. I believe almost every prominent breeder of live stock in the Northwest Territories receives these lists monthly, as well as a large number in the United States and throughout the Province of Ontario. Every executive officer of every farmers' institute in the Province get them regularly, and I have noticed that if a copy of the lists of stock for sale were missed by almost any of these gentlemen, I received a post card asking why it was, and desiring that the list be sent.

So successful have they been in the past that I have decided to advise the Dominion live stock associations to extend these lists. Up to date they have been published only in Ontario, although copies, as I said before, have been distributed in the other Provinces and across the line. These lists up to date have cost each Association less than $70 per annum. My proposition now is that this work be extended, and that an effort be made to induce every breeder of pure bred live stock in Canada to send monthly lists of stock for sale, and that these lists be published in the most widely circulated paper in the Maritime provinces, that we continue to publish them in Ontario, and that they be published in the most widely circulated paper in the Northwest. My reason for making this suggestion is that in Canada we have the climate, the men, the experience and the means for producing pure bred live stock for breeding purposes in more perfect condition than perhaps in any part of America, and geographically we are especially well suited for this trade. In the past this trade has proved of great value to Canada, but in recent years breeders of pure bred live stock have not been as successful as heretofore. There has been a great decline in the quality of our export cattle. In this particular, I respectfully draw your attention to the letter recently written by Mr. Thos. Crawford:

TORONTO, December 29th, 1898.

DEAR SIR,—Regarding my visit to the fat stock show held at Brantford this year, I must say that I enjoyed the trip very much, although I was unable to be present at any of the meetings held in connection therewith. I may also say that I approve of your new departure this year in regard to the swine, and I think perhaps it would be as well to extend the same treatment to cattle, sheep and poultry, and I believe that such a course if continued will prove beneficial to both feeder and consumer.

I think perhaps our exhibit of fat cattle in Brantford this year was fully up to our former efforts, but it is well known to cattle feeders throughout the Province that the quality of our feeding stock is deteriorating; and our best farmers and cattle feeders in Ontario are finding it difficult to get the class of steers they would like to find. I think our quarantine regulations should be somewhat modified in order that our importers and feeders may be encouraged to introduce some new blood into the country, and our farmers should be educated as to the necessity existing for the use of good thoroughbred bulls if the reputation which has been earned by the quality of our cattle in the past is to be sustained by them in the future

Yours very truly,

(Signed) THOS. CRAWFORD, M.P.P.

What he says is undoubtedly true, and it is also true that the Canadian export cattle sent from Montreal are worth one cent per pound less in Montreal than American cattle exported from that point. This should not be the case, but it is so. During the past fifteen or twenty years the profit derived from importing and breeding pure bred live stock has been steadily on the wane. Within the last ten years many men and firms which had heretofore been noted as producers of pure bred live stock have ceased to do business. This is a notable and deplorable fact. In this connection Mr. McCombie wrote nearly fifty years ago, "I have seldom if ever known a great breeder of pure bred live stock or an extensive drover to die rich." Nevertheless the drovers and the breeders of pure bred live stock are an absolute necessity to a country. The breeders of pure bred live stock, although not made rich from the pursuit of their calling, are of untold benefit to the country. What is the reason that in the Chicago market to-day hundreds of head of cattle are selling for one cent per pound, while others are selling as high as five cents per pound, and even higher? It is a question of breed—feed enters somewhat into the calculation, but unless a feeder has well bred cattle to consume his feed he can never command a profitable price for his produce. Animals for the export trade must be well bred and well fed. The importers and breeders of live stock in Canada have added millions of dollars to the revenue of this country, and the results of their labors will continue to bear fruit for years to come, while they themselves have failed to grow wealthy, and in some cases even to make a good living. That being the case it behooves all parties interested in our progress and national growth to do all in their power to assist the men who are doing as much for the country and so little for themselves.

It may be argued that the breeders of pure-bred stock are in the business for the money they can make out of it. If I were to say that that is not true the country would laugh at me, but I am willing to be laughed at, for I maintain it is not true. The men who breed pure-bred live stock are doing it for the love of the work. A successful

breeder is not made he is born. A man cannot buy a few head of pure bred stock, hang out his shingle and make money out of his venture, and produce good animals that will be a benefit to his country, unless he has had a life long training and an inborn love for the work. Again I say that a successful breeder of pure bred live stock is born and not altogether made by education. It is a deplorable fact that during the last five or ten years many men who have heretofore produced excellent pure bred animals of great value to the country for breeding purposes have actually gone to the wall, or have found their work so unprofitable that they have abandoned their calling Canada cannot afford this, therefore some steps must be taken to prevent our live stock from degenerating to a greater extent than they have already. Some say that because many Canadians sell the best animals to the States, the rank and file of the Canadian cattle have become poorer. Others say that the introduction of dairy stock has been a damage to the export cattle trade of Canada. There may be some truth in both of these statments, but the great reason why the rank and file of our cattle have become worse during the last five or ten years is because the breeders of pure bred live stock have not found their calling remunerative. That being the case let us adopt some means for overcoming the difficulty. Let us do all we can to extend the pure bred stock trade in Canada.

Although it is not as profitable to those engaged in it as it once was, it is a most valuable industry to the country, and should be profitable to the men engaged in it, for among them are many of the brightest and best men in Canada. We have done much during the past two years in reducing the railroad rates. We have great reason to thank the great railroad corporations for listening to our plea and helping us in this direction. We can now do much for ourselves by extending the interprovincial trade in pure bred live stock by taking up the lists of stock for sale and publishing them broadcast throughout the land. Let us commence by working up the large lists of stock for sale each month, and publishing them in the most widely circulated paper west of Fort William. Let us continue to publish these lists in Ontario, and let them be published in some widely circulated paper east of Montreal. By this means Canada will be more widely and better known as a producer of pure-bred live stock. Our breeders by making extensive sales will be encouraged to import from England and improve the stock bred here, and not only will the most extensive breeders profit by the scheme, but the man who owns one or two animals will be benefited in a marked degree.

Some have raised the objection that the publication of the lists of stock for sale was a benefit to the smaller breeders, but an injury to the well known man. This is a great mistake. The smaller breeder, if he meets with a ready sale, is ready to purchase again from the larger breeder. The extensive and well known breeder sells his stock to the man of less repute. The smaller breeder in turn sells his to the owner of a grade herd. If we extend the trade of what some are pleased to call "the smaller breeder," we will be benefiting all classes, including the importer.

The scheme that I propose to-day will cost upwards of $1,000 per year. Where is this money to come from? The question is one of national importance. It is to the interest of the Canadian farmer that the extensive breeder and importer of pure bred stock is successful. He has not been successful in the past; it is our duty to help him. His is a legitimate calling, and one of the greatest importance to the country; therefore, I propose that the Dominion Live Stock Associations shall ask the Minister of Agriculture for this Province to place in the supplementary estimates $1,000 to be used for the extension of the interprovincial trade. The railroad companies have done much for us; let us ask the country to help us also. The help asked is certainly due and should be cheerfully given. I therefore advise that a strong deputation be appointed from each of the Associations, and that these delegates meet at a certain time and interview the Minister of Agriculture for this Province concerning the question.

APPENDIX TO SECRETARY'S REPORT.

CONCESSIONS MADE BY THE RAILWAY COMPANIES AND NOT PREVICUSLY ANNOUNCED.

Hereafter Ontario exhibitors at Winnipeg, Portage la Prairie, Brandon, and other western exhibitions may load pure bred poultry in their straight or mixed cars of thoroughbred stock, and no additional charge will be made.

The Intercolonial Railway will hereafter carry pure bred animals at half rate on same terms as the C. P. R. and the G. T. R., and other Canadian lines.

British Columbia Rates.

For car load rates to British Columbia see page 11 of pamphlet above reviewed.

Single animals may be shipped from any station in Ontario where an Association car is being loaded to Vancouver or New Westminster at the following rates :—

Cattle.

Bulls.

Age.	
Under 6 months	$16 00
Over 6 and up to 12 months	25 00
Over 12 and up to 18 months	50 00
Over 18 and up to 24 months	52 00
Over 24 months	66 00

Cows and Heifers.

Age.	
Under 6 months	$16 00
Over 6 and up to 12 months	25 00
Over 12 and up to 24 months	39 00
Over 24 months	40 00

Horses.

The rate on stallions or mares is the rate on bulls or cows, respectively, plus one-tenth the rate on bulls or cows, respectively, to Calgary.

Pigs.

Must be crated in all cases

Weight (including crate).	
Under 50 lbs	$ 7 00
Over 50 and up to 100 lbs	12 00
Over 100 and up to 150 lbs	15 00
Over 150 and up to 200 lbs	17 00
Over 200 lbs	22 00*

Sheep.

Three sheep or under must be crated.

Weight (including crate).	
Under 100 lbs	$14 00
Over 100 lbs	16 00*

* Or upwards according to weight.

When over three sheep from one shipper to one consignee, will be placed in the car without being crated—

Weight.	
Under 100 lbs	$ 9 00
Over 100 lbs	10 00*

If stock enough is procured in any one shipment to consign the car through to the coast a material reduction will be made in the above rates.

Additional Instructions to Those Wishing to send Animals in the Association Cars.

Each bull eight months or over must have a copper ring in his nose; bulls over eight months, either shipped or brought to a loading point, without a ring will be rejected.

A first-class, new rope halter, made of good half-inch rope, must be furnished by the shipper with each bullock, and in addition to this, with each bull over eight months old, a strong new quarter-inch rope six feet long which must be tied to his ring. When the halter or rope as above described is not supplied by the shippers, one dollar extra will be added to the transportation charges to pay for said halter or rope and the trouble of procuring same.

TRADE CONTINUALLY.

The recent growth in trade has had the effect of stimulating the breeders of pure bred live stock to renewed efforts. Before the cheap rates were inaugurated many of the breeders were becoming discouraged and were taking less care of their breeding herds and flocks than in previous years, and some were contemplating going out of the business altogether, while others had decided to do so. All this is now changed, and the Ontario breeders are again beginning to import desirable animals from Britain to replenish their present herds, and we may now confidently look for a continued advance in the quality and number of the pure bred flocks and herds in Ontario.

It has been said by some that the reduced rates on pure bred stock has had the effect of causing breeders to ask larger prices than formerly for their animals, and that the reduced rates have simply gone into the pockets of the breeders, and have not benefited the buyers. On careful enquiry we find this is not the case. The demand and the supply govern the price of pure bred animals as well as that of other goods.

Another effect has been noticed as the result of increased activity in the pure bred trade. A few animals have been sold for breeding purposes which should never have been used for that purpose. There are a certain class of persons who always desire to buy cheap. This is a very unwise course when buying pure-bred animals. It has been truthfully said that the male is half the flock or herd, yet there are farmers who are so short-sighted that for the sake of saving a few dollars will buy a cheap and inferior sire. To all such we emphatically say that a first class line-bred grade is more desirable than a poor, scrawny, scrubby thing that is registered. There is no necessity for buying animals of inferior quality. There are plenty of good animals of good breeding, and the purchase of a poor pure-bred animal is nearly always evidence of penuriousness or bad judgment on the part of the buyer.

The shipments to the Northwest have, in most cases, been animals of from good to superior quality, yet there has been a few shipped in the Association cars which never

* Or upwards according to weight.

should have left the owner's stable other than in a butcher's wagon. Many of the good animals sent West were bought by the Secretary or other officers of the Live Stock Associations.

These gentlemen prefer that the eastern or western buyers purchase the animals from the breeders themselves, but in cases where they cannot do this, the Secretary or other officers will purchase for foreign buyers. Heretofore no charge has been made for this work except the actual or legitimate expenses incurred while doing the buying. This has never exceeded from two to five per cent. of the cost price of the animal.

Frequently no expenses are incurred and no charges made. In every case, with one exception, where the purchasing has been done by an officer of the Live Stock Associations, entire satisfaction has been given. The following are a number of testimonials received from foreign customers :—

MORLEY, ALBERTA, June 17th, 1899.

Indian Mission, Methodist Church, John McDougall, Chairman.

DEAR SIR,—I am particularly pleased with the bulls. They have been brought through in good shape, and my son and self congratulate ourselves on them. The gentleman who had them in charge did his duty by the stock entrusted to his care, as there is ample evidence of same.

Thanking you for your interest in us, I am,

Yours truly,

JOHN MCDOUGALL.

PRINCE ALBERT, June 14th, 1899.

DEAR SIR,—I reply to yours of June 5th *re* shipment of three bulls here. I must say they arrived O.K.

Yours truly,

THOS. S. DAVIS,
Per T. P. Manager.

MORDEN, June 13th.

DEAR SIR,—The pig shipped to me June 3rd has arrived safe and in good condition. I am well pleased both with the pig and his treatment. Pedigree also to hand.

Yours truly,

LEMON JICKLING.

THE GRANGE, STONEWALL, MAN, June 12th, 1899.

DEAR SIR,—Thanks for yours of the 5th inst. The two sows and boar arrived here on Saturday last (the 10th) in very good condition. They don't look any the worse for their long journey. Many thanks for the trouble you have taken.

Yours faithfully,

T. BRADFORD.

VIRDEN, June 12th, 1899.

DEAR SIR,—The bull calf shipped to me arrived all right, and in good condition.

Yours truly,

W. G. LEASK.

REGINA, NORTHWEST TERRITORIES, CANADA, May 27th, 1899.

DEAR SIR,—I have your letter of the 15th instant, advising me of a shipment of an Ayrshire bull calf from W. M. and J. C. Smith, Fairfield Plains. The calf has arrived safely and in good condition, and I am much pleased with it.

Yours very truly,

J. C. POPE.

CALGARY, ALBERTA, May 29th, 1899.

DEAR SIR,—I beg to thank you for your letter of 15th inst., regarding my thoroughbred stock, and am glad to inform you that they arrived on 25th inst. at Calgary, in good condition. I also wish to thank you for arranging the matter for me in such a thoroughly satisfactory way. I think the condition in which the cattle were on arrival did great credit to the man in charge. Believe me with many thanks.

Yours very truly,

A. L. S. d'EYNCOURT.

SOURIS, MAN., May 22nd, 1899.

DEAR SIR,—May 20th, the young bull shipped in "Association Car" reached his destination. Arrived in good condition. Everything satisfactory. Many thanks.

Yours truly,

J. H. KINNEAR

THE CLYDESDALE RANCH, MILLARVILLE P.O., ALTA., May 26th, 1899

DEAR SIR,—I had my bull yesterday morning No. 10. I am very much pleased in the way which he has been cared for on the way here. He was looking well and feeling in good form when he landed. I thank you very much for all the trouble you have taken in my interests.

I am, yours very truly,

ROBERT TURNER.

YORKTON, P.O., ASSA., June 18th, 1899.

DEAR SIR,—Filly shipped by J. M. Gardhouse arrived here all right. I don't think it got very well attended to from Portage; if it had not been for another fellow bringing horses from Birtle she would have arrived in not so good shape. It cost more to come from Portage than it did from Ontario to Portage. The Government should try to do something with the branch lines. I am satisfied with the way she (filly) was brought through on the whole.

I am, yours truly,

G. H. BRADBROOK.

N.B.—The Associations took charge of the filly from Ontario to Portage la Prairie, at which point she was re-shipped to Yorkton, via the M. & N. W. Railway. Our responsibility ends upon seeing stock properly re-shipped. We are in no way responsible for treatment received by stock on branch lines of railway in Manitoba.—F. W. HODSON.

DEPARTMENT OF AGRICULTURE, OTTAWA, May 17th, 1899.

DEAR MR. HODSON.—The sheep arrived all in good order, and I like them very much. With best regards and thanks for your work and bother.

I am, yours very truly,

SYDNEY FISHER.

DEPARTMENT OF AGRICULTURE AND MINES, ST. JOHN'S, NEWFOUNDLAND.

The Shorthorn bull, the consignment of sheep and the entire horse bought and shipped by you for this Government are very satisfactory in every particular. I must again thank you for your precaution in purchasing.

Please purchase three rams (one of each sort) some time during the summer. I will take them any time after July.

With kind regards,

Yours very truly,

THOS. C. DUDER,

Minister of Agriculture and Mines.

According to instructions received from Mr. George H. Greig, Secretary of the Cattle, Sheep and Swine Breeders' Association of Manitoba, space for three bulls was reserved from Ontario in one of the Association cars shipped on the 23rd of June. Two of these bulls were loaded at Burnside and delivered at Morley, Alta. The third, for which arrangements had been made to load at Qu'Appelle, was not on hand On the two bulls loaded our regular rates were paid as per schedule published above. From this it is evident that our rates in the Association car from Ontario to Calgary are cheaper than stock can be shipped from Burnside to Calgary.

PLAN TO RAISE THE STANDARD OF CANADIAN-BRED STOCK.

The Committee appointed to wait on the Ontario Government and ask for a grant of $1,000, to be used for the purpose of extending interprovincial trade, met in the Palmer House, Toronto, on Wednesday, March, 15th, 1899. The Committee was composed of the following gentlemen:

D. G. Hanmer, Burford, President Dominion Sheep Breeders' Association.

A. W. Smith, Maple Lodge, Vice-President Dominion Sheep Breeders' Association.

Geo. Green, Fairview, President Dominion Swine Breeders Association.

Wm. Jones, Mt. Elgin, Vice-President Dominion Swine Breeders' Association.

Arthur Johnson, Greenwood, late President Dominion Shorthorn Breeders' Association; Director Dominion Cattle Breeders' Association.

Richard Gibson, Delaware, Director Dominion Cattle and Sheep Breeders' Associations; late President Dominion Shorthorn Breeders' Association.

Dr. Jas. Mills, Guelph, President Ontario Agricultural College.

John I. Hobson, Guelph, President Dominion Cattle Breeders' Association; President Provincial Winter Fair Association; Vice-President Dominion Shorthorn Breeders' Association.

Peter Christie, Manchester, President Canadian Association.

J. D. Howden, Whitby, President South Ontario Agricultural Association.

Wm. Smith, Columbus, ex-President Canadian Clydesdale Association.

R. Miller, Stouffville, Vice-President Dominion Shorthorn Breeders' Association; late President Dominion Sheep Breeders' Association; Director American Shorthorn Breeders' Association.

W. E. Butler, Dereham Centre, Director Dominion Swine Breeders' Association.

Jos. E. Brethour, Burford, late President Dominion Swine Breeders' Association; Director Dominion Swine Breeders' Association; Director Provincial Winter Fair.

Major John A. McGillivray, Toronto, Director Dominion Sheep Breeders Association; Director American Sheep Breeders' Association.

J. W. Wheaton, Toronto, editor "Farming."

The following resolution was moved by D. G. Hanmer, seconded by Peter Christie, and carried: That this Committee, composed of representative stock men, are unanimously in favor of the plan outlined at the directors' meetings of the Live Stock Associations, to extend interprovincial trade in pure bred live stock, and consider it most important that in the interests of the country generally, Government assistance should be given in order to energetically pursue the policy laid down.

The deputation which, in addition to the above named gentlemen, consisted of twenty other prominent breeders of live stock, as well as a number of members of the Legislature, waited on the Cabinet at 2.15 p.m. Thursday, March 16th, 1899. The members of the deputation were introduced by D. Burt, Esq., member for North Brant. The points brought to the notice of the Government were: The general plan as outlined: the growth and present work of the Associations; history of the lists of stock for sale and how published; that breeders and importers of pure bred live stock have not made money out of their business in proportion to the benefit the country at large has received from their work; the desirability of extending the lists of stock for sale. These points are brought out in detail in the Report of the Secretary.

FOURTH ANNUAL REPORT

OF THE

DOMINION CATTLE BREEDERS' ASSOCIATION.

The annual meeting of the Dominion Cattle Breeders' Association was held in Shaftesbury Hall, Toronto, on February 9th, 1899. The report of the secretary-treasurer was read and adopted, and instructions given to have it printed and distributed among the stockmen of the Dominion.

Messrs. Arthur Johnston, Richard Gibson and Dr. Mills were appointed a committee from the Cattle Breeders' Association to form part of the deputation to wait on the Ontario Cabinet to ask for a grant of $1,000 for the purpose of increasing the inter-provincial trade in pure bred live stock.

The Executive, with Mr. John A. McGillivray, were appointed a committee to investigate the fraud in connection with reduced rates on shipments in car load lots of pure bred stock to Manitoba; this committee will decide as to what steps should be taken in the matter so as to protect the interests of the associations and the railway companies.

It was moved by Richard Gibson, seconded by James Russell, that we, the Dominion Cattle Breeders' Association, in annual meeting assembled, do hereby desire to impress upon the Dominion Government the desirability of allowing thoroughbred cattle to be imported without being subjected to the tuberculin test, and that the same order shall apply to cattle being imported from the United States, as soon as the United States authorities shall pass a similar order as regards Canada. (Carried unanimously.)

DIRECTORS' MEETING.

The directors of the Dominion Cattle Breeders' Association convened in the Palmer House, Toronto, February 8th, 1899, at 10 a.m. The circular now being issued by the railway companies, which allows calves, sheep and swine to be penned off in one end of the car when being shipped in less than car load lots of three or more, was presented for approval. It was decided that the Secretary make such changes in the circular as he considered in the best interests of the breeders.

The Provincial Winter Show.

The Association decided to increase the prizes in the cattle department ten per cent. on conditions similar to those mentioned in the report of the Dominion Sheep Breeders' Association, the judges to be Dr. Jas. Mills and Mr. John I. Hobson.

In the dairy department it was decided that no cow over thirty-six months should be given first prize which is not at the time of the show producing at the rate of ten pounds of butter per week, nor a second or third prize unless producing at the rate of seven pounds of butter per week. Heifers under thirty-six months shall be producing at the rate of eight pounds of butter per week in order to obtain a first prize, and seven pounds of butter per week in order to obtain a second or third prize. The number of pounds of butter shall be worked out on an eighty per cent. basis.

DOMINION CATTLE BREEDERS' ASSOCIATION.

Officers for 1899.

President ..... John I. Hobson, Guelph.

Vice-President ..... H. D. Smith, Compton, Que.

Second Vice-President ..... H. Wade, Toronto.

Secretary-Treasurer ..... A. P. Westervelt, Toronto

Vice Presidents (representing the different Provinces):

Ontario	J. C. Snell, London.
Manitoba	Hon. Thos. Greenway, Winnipeg.
Northwest Territories	W. E. Cochrane, High River Calgary, Alta.
Quebec	Robert Ness, Howick, Que.
Nova Scotia	W. W. Black, Amherst, N.S.
New Brunswick	T. A. Peters, Fredericton, N.B.
Prince Edward Island	Senator D. Ferguson, Charlottetown, P.E.I.
British Columbia	A. C. Wells, Chilliwack, B.C.
Newfoundland	Hon. Thos. C. Duder, St. John's, Nfl'd.

Auditor ..... J. M. Duff, Guelph.

Directors:

Shorthorns	Arthur Johnston, Greenwood.
Herefords	Alf Stone, Guelph.
Polled Angus	Jas Bowman, Guelph.
Galloways	D. McCrae, Guelph.
Ayrshires	D. Drummond, Myrtle.
Holsteins	G. W. Clemons, St. George.
Jerseys	R. Gibson, Delaware.
Guernseys	W. E. Butler, Dereham Centre.
Ontario Agricultural College	Prof. G. E. Day, O.A.C., Guelph.

Representatives to Fair Grounds:

Toronto Industrial	Prof. G. E. Day, Guelph, and J. M. Gardhouse Highfield.
Ottawa	J. G. Clark, Ottawa, and H. D. Smith, Compton, Que.
London	R. Gibson, Delaware, and T. E. Robson, Ilderton.
Brantford	G. W. Clemons, St. George, and J. R. Alexander, Brantford.

Delegates to the Board of the Provincial Winter Fair:

John I. Hobson, Guelph; G. W. Clemons, St. George; and Richard Gibson, Delaware.

FINANCIAL STATEMENT TO DECEMBER 31ST. 1898.

Receipts.

Cash on hand from previous year as per last report	$ 87 39
Members' fees	99 00
Legislative grant	1,500 00
Total	$1,686 39

Expenditure.

Grants to other societies, fairs, etc. Fat Stock Show	$1,282 51
Officers' salaries	150 00
Directors' fees and expenses	103 42
Postage and stationery	62 30
Printing	83 03
Cost of reporting	1 18
Typewriting and preparing annual report	83 00
Telegraph and telephone	5 09
Express	3 35
Expenses *re* exhibition tent	3 40
Folding and wrapping papers	5 00
Balance on account of stock cars to Manitoba	24 53
Cleaning office	1 30
Total	$1,808 11
Balance due treasurer	$121 72

Examined and found correct
this 6th day of February, 1899.

J. M. DUFF, Auditor.

JOHN I. HOBSON,
President.

F. W. HODSON,
Secretary-Treasurer.

MEMBERS OF CATTLE BREEDERS' ASSOCIATION.

Name.	Address.	Class.
Alexander, J. R	Brantford, Ont.	Ayrshires.
Arnold & Son, H. G	Maidstone, Ont	
Attrill, Mrs. H. F	Saltford, Ont	Holsteins.
Barclay, Luther	Port Hope, Ont	Shorthorns.
Ballantyne, W. W	Stratford, Ont	Ayrshires.
Biggins, W. J	Clinton, Ont	Shorthorns.
Bright, John	Myrtle, Ont	Shorthorns.
Birrell, David	Greenwood, Ont	Shorthorns.
Birdsall & Son, F	Birdsall, Ont	
Bowman, Jas	Guelph, Ont	Polled Angus.
Bolton, A. & F	Armstrong Mills, Ont	Shorthorns.
Bonny castle & Son, F	Campbellford, Ont	Shorthorns.
Boden, Jas	St. Anne de Bellevue, Que	Ayrshires.
Brooks, Chas	Brantford, Ont	Ayrshires
Brooks, R. S	Brantford, Ont	Ayrshires.
Brown, J	Galt, Ont	Herefords.
Bull & Son, B. H	Brampton, Ont	Jerseys.
Butler & Son, Wm	Dereham Centre, Ont	Guernseys.
Bennet, L. G	Greenbank, Ont	Shorthorns.
Burt, J. W	Coningsby, Ont	Polled Angus.
Brodie, G. A.	Bethesda, Ont	Shorthorns.
Caldwell, Bros	Orchard, Ont	Ayrshires.
Campbell, John	Woodville, Ont	Shorthorns.
Chapman & Son, J. G	St. Thomas, Ont	Shorthorns.
Clemons, G. W	St. George, Ont	Holsteins.
Cooper, J. V	Picton, Ont	Shorthorns.
Cowan, Wm	Galt, Ont	

MEMBERS OF CATTLE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
Davis, J. F.	Tempo, Ont.	Shorthorns.
Dredge & Son, Wm	Nassagaweya, Ont.	Shorthorns.
Dent, T. H.	Woodstock, Ont	Jerseys.
Dickenson, Wm	Mildmay, Ont.	Shorthorns.
Douglas, Jas	Caledonia, Ont.	Shorthorns.
Dyment, N.	Clappison's Corners, Ont.	Ayrshires.
Dundas, R. D.	Springville, Ont	Ayrshires.
Duncan, Rev. W. A	Sault Ste. Marie, Ont	Jersey.
Edwards, W. C. & Co.	North Nation Mills, Que	Jerseys, Shorthorns, Ayrshires.
Elliott, W. R	Hespeler, Ont.	Shorthorns.
Elliott, Wesley J.	New Durham, Ont.	Shorthorns.
Eidridge, John	Hepworth Station, Ont	Shorthorns.
Edmondson, Alex.	Brantford, Ont	
Flatt, W. D	Hamilton, Ont	Shorthorns.
Fairbairn, H. K.	Thedford, Ont.	Shorthorns.
Fleming, J. S	Gill. Ont	
Fried & Sons, J	Roseville, Ont	Shorthorns.
Gardhouse, J. M.	Highfield, Ont.	Shorthorns.
Grainger & Son, Wm.	Londesboro', Ont	Shorthorns.
Garnham, E. A.	Straffordville, Ont.	Shorthorns.
Gies, C. R.	Heidelberg, Ont	Holsteins.
Gorwill, S B.	Fanshawe, Ont	Shorthorns.
Guy, Frank	Bowmanville, Ont.	Ayrshires.
Hallman, A. C	New Dundee, Ont.	Holsteins.
Hall, Walter.	Washington, Ont	Polled Angus.
Hauser, I	Weissenburg, Ont	
Hood, G. B	Guelph, Ont.	Grades.
Hobson, J. I	Guelph, Ont.	Shorthorns.
Hume, Alex.	Menie, Ont	Ayrshires.
Hoover, A., jr	Emery, Ont.	Holsteins.
Jeffs, & Son, E.	Bond Head, Ont.	Shorthorns.
Jones, Mrs. E. M.	Brockville, Ont	Jerseys.
Kaufman, A. E	Washington, Ont	Polled Angus.
Kelly, John.	Shakespeare, Ont	Shorthorns.
Leask, Jas	Green Bank, Ont	Shorthorns.
Leitch, D	Grant's Corners, Ont.	Ayrshires.
Legge, Thos.	Temperanceville, Ont	Shorthorns.
Lemon, S	Kettleby, Ont.	
Lloyd-Jones, T. & Son	Burford, Ont.	Guernseys.
Martyn, J. W	Canton, Ont.	Shorthorns.
Martindale, F	York, Ont.	Shorthorns.
Marshall, Peter	Ayr, Ont	Herefords.
Miller, R	Brougham, Ont	Shorthorns.
Milloy, D	Paris, Ont.	Shorthorns.
Milne, David.	Ethel, Ont	Shorthorns.
Murrison, Jas	West Lorne, Ont	Polled Angus.
McCrae, David.	Guelph, Ont	Galloways.
McCallum, John R	Iona Station, Ont	Shorthorns.
McKee, H. & J.	Norwich, Ont	Ayrshires.
McIntyre, D. N	Paisley. Ont.	Shorthorns.
McGillivray, J. A.	Toronto, Ont	
McCormack, Jas. & Son	Rockton, Ont	Ayrshires.
McDougal, H	Guelph, Ont.	Polled Angus.
Nichols, W. H	Hamilton, Ont	Ayrshires.
Nichol, Walter.	Plattsville, Ont	

MEMBERS OF CATTLE BREEDERS' ASSOCIATION.—*Concluded.*

Name.	Address.	Class.
Oke, Jas. & Son	Alvinston, Ont	Shorthorns.
O'Brien, John	London West Ont	Jerseys.
Oliver, Wm	Avon Bank, Ont	
Pettit, W. G	Freeman, Ont	Shorthorns.
Peterson, C. W	Regina, Assa	Ayrshires, Highland Cattle.
Rawlings, Albin	Forest, Ont	Herefords.
Randall, Thos	Brantford, Ont	
Rankin, S.	Fairview, Ont	Shorthorns.
Reid & Co, R	Hintonburg, Ont	Ayrshires.
Rennie, Jas	Wick, Ont	Shorthorns.
Rennie Malcolm	New Hamburg, Ont	Shorthorns.
Rice, A. & G.	Curries, Ont	Holsteins.
Robertson, Thos	Dunsford, Ont	Polled Angus.
Robson, T E	Ilderton, Ont	Shorthorns.
Robson, W. & Son	Ayr, Ont	
Robson, Walter	Washington, Ont	
Rudd, W. J	Eden Mills, Ont	Devons.
Russell, Thos. & Son	Exeter, Ont	Shorthorns.
Rusnell, D. H	Stouffville, Ont	Shorthorns.
Rutherford, J. & Son	Roseville, Ont	Herefords.
Rudd, R. R	Eden Mills, Ont	
Sharp, Jas	Rockside, Ont	Polled Angus.
Shaw, A M. & Robt	Brantford, Ont. (Box 632)	Galloways.
Snell, J. C	Snelgrove, Ont	Jerseys.
Stewart, Wm. jr	Menie, Ont	Ayrshires.
Stevenson, R. S	Ancaster, Ont	Holsteins.
Stewart, Wm. & Son	Lucasville, Ont	Polled Angus.
Steacy, R. G	Brockville, Ont	Ayrshires.
Stephen, W. F	Trout River, Que	Ayrshires.
Smith, Amos	Trowbridge, Ont	Shorthorns.
Smith, W. M & J. C	Fairfield Plains, Ont	Ayrshires.
Smith, Jas. H. & Son	Highfield, Ont	Jerseys.
Sibbald, John	Annan, Ont	Galloways.
Smith, H. D	Compton, Que	Herefords.
Smith, H. & W	Hay, Ont	Shorthorns.
Simmons, C. M	Ivan, Ont	Shorthorns.
Snider, J. R	Humber, Ont	
Skilliter, T. A	Grenfell, Assa	Shorthorns.
Smith, A. W	Maple Lodge, Ont	Shorthorns.
Sorby, D & O	Guelph, Ont	Ayrshires.
Scott, F. W	Highgate, Ont	Shorthorns.
Stone, Alf	Guelph, Ont	Herefords.
Stone, F. W. Estate	Guelph, Ont	Herefords.
Tape Bros	Ridgetown, Ont	Shorthorns.
Thompson, Wm. Temple	Rockton, Ont	Ayrshires.
Trimble, A. H	Red Deer, Alta	Ayrshires.
Varcoe, Maj. John	Carlow, Ont	Polled Angus.
Van Nostrand, J. A	Vandorf, Ont	Shorthorns.
Wells, Martin	Canning, Ont	
Willis, W	Newmarket, Ont	Jerseys.
Wilson, Matt	Fergus, Ont	
Yuill, J. & Sons	Carleton Place, Ont	Ayrshires.

DOMINION SHEEP BREEDERS' ASSOCIATION.

Officers for 1899.

President ..... D. G. Hanmer, Burford.

Vice-President ..... A. W. Smith, Maple Lodge.

Secretary-Treasurer ..... A. P. Westervelt, Toronto.

Directors :

Cotswolds ..... D. McCrae, Guelph.

Leicesters ..... W. Whitelaw, Guelph.

Hampshires ..... John Kelly, Shakespeare.

Dorsets ..... R. H. Harding, Thorndale.

Southdowns ..... John Jackson, Abingdon.

Oxfords ..... Jas. Tolton, Walkerton.

Lincolns ..... Wm. Oliver, Avonbank.

Merinos ..... W. M. Smith, Fairfield Plains.

Shropshires ..... R. Gibson Delaware.

Ontario Agricultural College ..... Prof. G. E. Day, Guelph.

General Director ..... J. C. Snell, London.

Auditor ..... J. M. Duff, Guelph.

Representatives to Fair Boards :

Toronto Industrial ..... F. W. Hodson, Toronto ; Jas. Russell, Richmond Hill.

Ottawa ..... Joseph Yuill, Carleton Place.

Montreal ..... H. D. Smith, Compton, Que.

London ..... A. W. Smith, Maple Lodge ; R. H. Harding, Thorndale.

Delegates to the Board of the Provincial Winter Fair :

R. H. Harding, Thorndale ; A. W. Smith, Maple Lodge ; Jas. Tolton, Walkerton.

ELEVENTH ANNUAL REPORT

OF THE

DOMINION SHEEP BREEDERS' ASSOCIATION.

The annual meeting of the Dominion Sheep Breeders' Association convened in Shaftsbury Hall, February 7th, 1899, the President, Mr. D. D. Hanmer in the chair. After hearing the President's address, it was moved by D. McCrae, seconded by Wm. Linton, that it having come to our knowledge that certain parties have shipped stock fraudulently under our special privileges, we hereby request our Directors to take such steps as may aid the railway companies to prevent such fraud in future and bring the guilty parties in the instance stated to justice. (Carried.)

It was moved by John A. McGillivray, seconded by R. H. Harding, that Messrs. John Jackson, Jas. Tolton and Jas. Russell be a committee to investigate the matter brought up by Mr. John Campbell, of Woodville, regarding the exhibit at Toronto Industrial of 1898, and to report to the Board of Directors. (Carried.)

The report of the Secretary was then presented. Acting upon the suggestion contained therein, it was moved by Wm. Linton, seconded by D. McCrae, that the executive officers of this Association, namely, D. G. Hanmer, A. W. Smith, and F. W. Hodson, with power to add to their number, be the representives from the Dominion Sheep Breeders' Association on the deputation from the various Live Stock Associations to wait on the Ontario Cabinet to lay before them a request for a grant of $1,000 to be used for the purpose of extending our interprovincial trade in pure bred live stock. (Carried.)

Other matters contained in the report were left in the hands of the directors.

Expert Judges.

Cotswolds.—Jas. Russell, Richmond Hill; Wm. Thompson, Uxbridge; Thos. Teasdale, Concord; D. McCrae, Guelph; H. Rawlings, Ravenswood; Val. Ficht, Oriel; J. C. Snell, London; T. Hardy Shore, Glanworth; Geo. Weeks, Glanworth; Wm. Ward, Uxbridge; W. G. Laidlaw, Wilton Grove; Wm. Rae, Arkell; Joseph Ward, Marsh Hill; John Park, Oriel; Jos. D. Davidson, Belhaven; A. Johnston, Greenwood; John Goodfellow, Maxville; Andrew Russell, Carrville; A J. Watson, Castlederg.

Leicesters.—Jas. Gaunt, St. Helen's; John Wells, Galt; Hardy Shore, Glanworth; Abraham Easton, Appleby; E. Wood, Appleby; Wm. Parkinson, Eramosa; E. Parkinson, Eramosa; John Orr, Galt; Wm. Watt, Salem; Wm. McIntosh, Burgoyne; Thos. Currelly, Fullarton; R. Eastwood, Mimico; John Kelly, Shakespeare; Andrew Thompson, Fergus, J. K Campbell, Palmerston; J. C. Snell, London; G. B. Armstrong, Teeswater; John Gibson, Denfield; C. E. Wood, Freeman; Jos. Gaunt, St. Helen's; J. M. Gardhouse, Highfield; John Laidlaw, Wilton Grove; Andrew Whitelaw, Guelph; William Whitelaw, Guelph; R. C. Martin, Marysville; Alex. Smith, Maple Lodge; Alex. Waldie, Acton; Walter Nichol, Plattsville; H. G. Arnold, Maidstone; Prof. Craig, Ames, Iowa; John Marshall, Cass City, Mich; J. W. Murphy, Cass City, Mich.; Prof. Curtiss, Ames, Iowa; D. C. Graham, Cameron, Ill.

Dorests.—John Jackson, Abingdon; J. G. Hanmer, Mt. Vernon; Richard Gibson, Delaware; W. H. Beattie, Wilton Grove; Prof. Curtiss, Ames, Iowa; Thos. W. Hector, Springfield on-the-Credit; G. P. Everett, Mt. Vernon; Mortimer Levering, Lafayette. Ind.; Arthur Danks, Allamuchy, N.J.; Prof Craig, Ames, Iowa; G. E. Day, Guelph; Jas. Tolton, Walkerton; H. N. Gibson, Delaware; R. H. Harding, Thorndale; M. A. Cooper, Washington, Pa.; J. E. Wing, Michamitburgh, O.

Southdowns.—John Miller, Markham ; Wm. Martin, Binbrook ; H. N. Gibson, Delaware ; John Jackson, Abingdon ; T. C. Douglas, Galt ; Henry Arkell, Teeswater ; W. H. Beattie, Wilton Grove ; A. Simenton, Blackheath ; Geo. L. Telfer, Paris ; J. G. Hanmer, Mt. Vernon ; J. Scott, Aberfoyle ; C. Baker; Simcoe ; Jas. Smith, Mt. Vernon ; H. B Jeffs, Bond Head.

Oxfords—Smith Evans, Gourock ; Jas. Tolton, Walkerton ; R. H. Hine, Dutton, Kenneth Finlayson, Campbellton ; Henry Arkell, Arkell ; Wm. Dickison, Mildmay ; Peter Arkell, Teeswater ; Herbert Wright, Guelph ; John Harcourt, St. Ann's ; J. H. Jull, Mt. Vernon ; Henry Arkell, Teeswater ; John E. Cousins, Harriston ; Arch. McKenzie, Corwhin ; R. E. Birdsall, Birdsall ; Geo. McKerrow, Madison, Wis. ; W. A. Shafor, Middleton, O. ; J. C. Williamson, Xenia, O. ; J. V. Cooper, Picton ; Wm. Newman, Cherry Valley ; Wm. Arkell, Teeswater ; Jas. L. Tolton, Walkerton ; L. Parkinson, Greenock.

Hampshires and Suffolks.—Henry Arkell, Arkell ; R. Gibson, Delaware ; I. Hillier, Thornton, Mich. ; John I. Gordon, Mercer, Pa. ; John A. Craig, Ames, Iowa.

Lincolns.—J. T. Gibson, Denfield ; Wm. Oliver, Avonbank ; E. Parkinson, Eramosa ; T. E Robson, Ilderton ; G. Walker, Ilderton ; John Geary, London ; J. C. Snell, London ; R. W. Stevens, Lambeth ; L. Parkinson, Eramosa . T. Rolph, Ballymote ; L. Goodwin, Munroe ; John Mitchell, Glencoe ; John White, Eramosa ; Alex. Smith, Maple Lodge ; Wm. Whitelaw, Guelph.

Merinos—W. M. Smith, Fairfield Plains ; R Shaw, Glanford Station ; W. H. Beattie, Wilton Grove ; Rock Bailey, Union ; Andrew Tirrell, Wooler ; G. P. Everett, Mt. Vernon.

Shropshires.—R. Gibson, Delaware ; G. P. Everett, Mt. Vernon ; J. Donworth, Paris ; W. H. Beattie, Wilton Grove ; A. Brown, Picton ; R. Miller, Brougham ; J. Hanmer, Burford ; Jas. McFarlane, Clinton ; J. Campbell, Woodville ; D. G. Hanmer, Burford ; Jas. Phinn, Hespeler ; M. Levering, Lafayette, Ind. ; A. Elliott, Galt ; J. Dickin, Milton West ; J. S. Thompson, Gas City, Ind. ; Geo. Allen, Allerton, Ill. ; W. G. Pettit, Freeman ; D. J. Campbell, Woodville ; G. Phinn, Hespeler ; Chas. Calder, Brooklin ; H. N. Gibson, Delaware ; Geo. Hindmarsh, Ailsa Craig ; C. W. Gurney, Paris ; W. E. Wright, Glanworth ; J. Miller, Brougham ; H. Hanmer, Burford ; Prof. Curtiss, Ames, Iowa ; Prof. Craig, Ames, Iowa.

Judges for Toronto.—Mortimer Levering, Lafayette, Ind ; Geo. Hindmarsh, Ailsa Craig ; G. P Everett, Mt. Vernon, substitute.

Judges for London—W. G. Pettitt, Freeman ; J. P. Phinn, Hespeler, substitute.

Judge for Ottawa.—R. Gibson, Delaware.

Judges for Fat Stock Show.—Prof. Curtis, Ames, Iowa. ; Prof. Craig, Ames, Iowa, substitute,

After appointing the officers and directors for 1899, the meeting adjourned.

DIRECTORS' MEETING.

The Board of Directors of the Dominion Sheep Breeders' Association convened in the Palmer House, Tuesday, February 7th, 1899, at 10 a.m. The suggestions contained in the report of the Secretary were given careful consideration The meeting then adjourned to meet again at 5.30 p.m.

It was decided that ten per cent. be added to the prizes awarded to any exhibitor in the sheep department upon his furnishing the Secretary within fourteen days after the exhibition particulars of a practical nature as to the feeding and care of the sheep exhibited by him ; the judges of the essays to be Dr. Jas. Mills, O.A.C,, Guelph, and John I Hobson, Guelph.

The judges recommended for the sheep department at the Provincial Winter Show are :

Shropshires, Southdowns, Dorsets and Merinos.—Prof. C. F. Curtiss, Ames, Iowa.

Leicesters, Lincolns, and Cotswolds.—Jas. Gaunt, St. Helen's.

Grades.—Prof. John A. Craig, Ames, Iowa.

Oxfords, Suffolks and Hampshires.—Geo. McKerrow, Sussex, Wis.

It was resolved that the printing and advertising be conducted on lines similar to those of last year.

FINANCIAL STATEMENT TO DECEMBER 31ST, 1898.

Receipts.		*Expenditure.*	
Cash on hand from previous year as per last report	$ 21 98	Grants to other societies, fairs, etc., Fat Stock Show	$1,131 02
Members' fees	94 00	Officers' salaries	150 00
Legislative grant	1,500 00	Directors' fees and expenses	63 85
		Postage and stationery	60 35
		Printing	85 29
		Cost of reporting	1 18
		Typewriting and preparing annual report	83 00
		Telegraph and telephone	5 48
		Express	2 95
		Cleaning office	1 35
		Expenses *re* exhibition tent	3 41
		Folding and wrapping papers	5 00
		Balance on account stock cars to Manitoba	24 53
Total	$1,615 98	Total	$1,617 41
		Balance due treasurer	1 43

Examined and found correct this 6th day of February, 1899.

D. G. HANMER, President.

J. M. DUFF, Auditor.

F. W. HODSON, Treasurer.

MEMBERS OF SHEEP BREEDERS' ASSOCIATION.

NAME.	ADDRESS.	CLASS.
Allen, George	Oriel, Ont.	Cotswolds.
Allen, S.	Cooper, Ont.	Cotswolds.
Arkell, Henry.	Teeswater, Ont	Oxfords.
Armour, And.	Dunnville, Ont	Leicesters.
Armstrong, G. B.	Teeswater, Ont	Leicesters.
Arkell, Henry	Arkell, Ont.	Oxfords.
Austin, W. R.	Sapperton, B.C.	Southdowns.
Baker, George & Son	Simcoe, Ont.	Southdowns.
Blackwood, Robert	Martintown, Ont.	Shropshires.
Blais, A. & J.	St. Anne de Prescott, Ont.	Leicesters.
Beattie, W. H.	Wilton Grove, Ont.	Shropshires.
Birdsall, F. & Son	Birdsall, Ont.	Oxfords.
Brown, Alfred	Picton, Ont.	Shropshires.
Bowman, Jas.	Guelph, Ont.	Dorsets.
Bonnycastle, F. & Son	Campbellford, Ont.	Cotswolds.
Brown, John L.	Uxbridge, Ont.	Cotswolds.
Bright, John	Myrtle, Ont.	Shropshires.

MEMBERS OF SHEEP BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
Campbell, John	Woodville, Ont.	Shropshires.
Charters, Robt.	Egmondville, Ont.	Leicesters.
Conworth, J.	Paris, Ont.	Shropshires.
Cowieson, John	Queensville, Ont.	Leicesters.
Cousin, J. & Son	Harriston, Ont.	Oxfords.
Cornish, J. W.	Orchard, Ont	Dorset Horns.
Cornish, John, sr.	Orchard, Ont.	Dorset Horns.
Cooper, J. V.	Picton, Ont.	Oxfords.
Copeland, W. E.	Teeswater, Ont.	Shropshires.
Currelley, T. & Son	Fullerton, Ont.	Leicesters.
Dickenson, Wm.	Mildmay, Ont.	Oxfords.
Douglas, T. C.	Galt, Ont.	Southdowns.
Donaldson, W.	South Zorra, Ont.	Shropshires.
Douglass, Jas.	Caledonia, Ont.	Leicesters.
Evans, Smith	Gourock, Ont	Oxfords.
Elliott, And.	Pond Mills, Ont.	Oxfords.
Elliott, W R.	Hespeler, Ont	Oxfords.
Ewing, J B.	Dartford, Ont.	Shropshires.
Everett, G. P.	Mt. Vernon, Ont	Shropshires.
Frink, B. H.	Napanee, Ont.	Cotswolds.
Ficht, Val.	Oriel, Ont.	Cotswolds.
Finlayson, Kenneth	Campbellton, Ont.	Oxfords.
Gardhouse, J. & Son	Highfield, Ont.	Leicesters.
Garnham, E. A.	Straffordville, Ont	Leicesters.
Gaunt, E. & Sons	St. Helens, Ont.	
Gibson, R.	Delaware, Ont.	Shropshires.
Gibson, J T	Denfield, Ont.	Lincolns
Gibbs, John	Woodvide, Ont	Cotswolds.
Gould, Geo. & Son	Rutherford, Ont.	Lincolns.
Gurney, C. W	Paris, Ont.	
Hawkshaw, W. S.	Glanworth, Ont.	Shropshires.
Harding, R. H.	Thorndale, Ont.	Dorset Horns.
Hanmer, D. G.	Burford, Ont.	Shropshires.
Hanmer Bros.	Mt. Vernon, Ont.	Shropshires.
Hart, Alex.	Hampstead, Ont.	
Hanmer, J. G.	Mt. Vernon, Ont.	Shropshires.
Hine, R. J.	Dutton, Ont.	Oxfords.
Higginson, C. T. & Son	Chilliwack, B.C.	Shropshires.
Hobson, J. I.	Guelph, Ont.	
Honey, R.	Brickley, Ont.	Cotswolds.
Hunter, John	Wyoming, Ont.	Horned Dorsets.
Innes, Donald	Tobique River, N.S.	Cotswolds.
Jeffs, E. & Son	Bond Head, Ont.	Southdowns and Leicesters.
Jackson, John	Abingdon, Ont.	Southdowns.
Jull, J. H.	Mt. Vernon, Ont.	Oxfords.
Johnston, J. W.	Underwood, Ont.	Leicesters.
Kelly, John	Shakespeare, Ont.	Hampshires and Leicesters.
Laidlaw, John	Wilton Grove, Ont.	Leicesters.
Laird, G. H. & R.	Guelph, Ont.	Cotswolds.
Linton, Wm.	Aurora, Ont.	Cotswolds,
Lloyd-Jones, T.	Burford, Ont	Shropshires.
Martin, Wm.	Binbrook, Ont.	Southdowns.
Martin, R. G.	Marysville, Ont.	Leicesters.
Maynard, John	Chilliwack, B.C.	
Martin, E. E. & Son	Canning, Ont.	Southdowns.
Millar, R.	Brougham, Ont.	Shropshires.
Meyer, J. E.	Kossuth, Ont.	Cotswolds.

MEMBERS OF SHEEP BREEDERS' ASSOCIATION.—*Concluded.*

Name.	Address	Class.
McCrae, D.	Guelph, Ont.	Southdowns and Cotswolds.
McFarlane, Jas.	Clinton, Ont.	Shropshires.
McCrae, Wm.	Guelph, Ont.	Cotswolds.
McKellar, J.	Avonton, Ont.	Horned Dorsets.
McGillivray, J. A.	Uxbridge, Ont.	Horned Dorsets.
McRobie, Fred.	Iroquois, Ont.	Leicesters.
McEwen, Robt.	Byron, Ont.	Southdowns.
Newman, Wm.	Cherry Valley, Ont.	Oxfords.
Oliver, Wm.	Avonbank, Ont.	Lincolns.
Orr & Lillico	Galt, Ont.	Leicesters.
Parkinson, L.	Eramosa, Ont.	Lincolns and Leicesters.
Parkinson, E.	Eramosa, Ont.	Lincolns.
Parks, John	Burgessville, Ont.	Cotswolds.
Parks, E. & N.	Oriel, Ont.	Cotswolds.
Pollard, A.	Burford, Ont.	
Pettitt, W. G.	Freeman, Ont.	Shropshires.
Patrick, J. H.	Ilderton, Ont.	Lincolns.
Rae, Wm.	Arkell, Ont.	
Rennie, Wm. A.	Shakespeare, Ont.	Leicesters.
Robson, Thos. E.	Ilderton, Ont.	Lincolns.
Russell, Jas.	Richmond Hill, Ont.	Cotswolds.
Rutherford, John	Roseville, Ont.	Southdowns.
Rudd, W. J.	Eden Mills, Ont.	Suffolks.
Swayze, D. R.	Wringer, Ont.	Cotswolds.
Stevens, R. W.	Lambeth, Ont.	Lincolns.
Snell, Jas.	Clinton, Ont.	Leicesters.
Snell, J. C.	London, Ont.	Cotswolds.
Stevens, Wm.	Lambeth, Ont.	Lincolns.
Simenton, A. & Son	Blackheath, Ont.	Southdowns.
Smith, W. M. & J. C.	Fairfield Plains, Ont.	Merinos.
Smith, J. S.	Maple Lodge, Ont.	Leicesters.
Smith, A. W.	Maple Lodge, Ont.	Leicesters.
Scott, Jas.	Aberfoyle, Ont.	Southdowns.
Shore, Hardy	Glenworth, Ont.	Cotswolds.
Telfer, A. & Son	Paris, Ont.	Southdowns.
Tolton, Jas.	Walkerton, Ont.	Oxfords.
Thompson, Wm.	Uxbridge, Ont.	Cotswolds.
Thompson, Jas.	Mildmay, Ont.	Suffolks.
Thompson, Wm.	White Rose, Ont.	
Vance, Ed.	Emerson, Man.	Dorsets.
Vance, Robt.	Ida, Ont.	Cotswolds.
Walker, G.	Ilderton, Ont.	Lincolns.
Watt, W. B.	Salem, Ont.	Leicesters.
Wren, Christopher	Uxbridge, Ont.	Shropshires.
West, Wm.	Ilderton, Ont.	Lincolns.
Wright, W. E.	Glanworth, Ont.	Shropshires.
Whitelaw, A. & W.	Guelph, Ont.	Leicesters and Cotswolds.
Wilkie, G. N.	Wisbeach, Ont.	
Wood, C. & E.	Freeman, Ont.	Leicesters.
Yuill, J. & Sons	Carleton Place, Ont.	Shropshires.

DOMINION SWINE BREEDERS' ASSOCIATION.

Officers for 1899.

President ..... Geo. Green, Fairview.
Vice-President ..... Wm. Jones, Mt. Elgin.
Secretary-Treasurer ..... A. P. Westervelt, Toronto.

Directors:

Berkshires ..... Thos. Teasdale, Concord.
Yorkshires ..... G. B. Hood, Guelph.
Chester Whites ..... R. H. Harding, Thorndale.
Poland Chinas ..... W. M. Smith, Fairfield Plains.
Duroc Jerseys ..... W. E. Butler, Dereham Centre.
Tamworths ..... Andrew Elliott, Galt.
Suffolks and Essex ..... Jos. Featherston, Streetsville.
Ontario Agricultural College ..... Prof. G. E. Day, O.A.C., Guelph.
General Director ..... J. E. Brethour, Burford.
Auditor ..... J. M. Duff, Guelph.

Representatives to Fair Boards:

Toronto Industrial ..... Thos. Teasdale, Concord, and J. E. Brethour, Burford
Ottawa ..... Jos. Featherston, Streetsville and Jos. Yuill, Carleton Place.
London ..... Geo. Green, Fairview, and D. DeCourcy, Bornholm.
Montreal ..... Jos. Featherston, Streetsville.
Quebec ..... O. E. Talbot, Bellechasse, Que.
Peterborough ..... Robert Vance, Ida.
Guelph ..... G. B. Hood, Guelph and James Anderson, Guelph.
Brantford ..... T. A. Cox, Brantford, and Geo. Thompson, Bright.
Belleville ..... J. M. Hurley, Belleville.
Kingston ..... J. M. Hurley, Belleville.

Committees.

Executive and Transportation.—President, Vice-President and Secretary.

Delegates to the Board of the Provincial Winter Fair.—Geo. Green, Fairview; G. B. Hood, Guelph; J. E. Brethour, Burford.

TENTH ANNUAL REPORT

OF THE

DOMINION SWINE BREEDERS' ASSOCIATION.

The annual meeting of the Dominion Swine Breeders' Association was held in the Grand Trunk Reading Room, Brantford, December 2nd, 1898, the President Mr. Geo. Green, in the chair.

The officers and directors for the ensuing year were elected.

Expert Judges Appointed.

Berkshires.—H. J. Davis, Woodstock; J. C. Snell, London; Thos. Teasdale, Concord; George Green, Fairview; Robert Vance, Ida; T. A. Cox, Brantford; James Quarrie, Delaware; Jos. Featherston, M.P, Streetsville; R. P. Snell, Snelgrove; Malcolm McArthur, Lobo; C. R. Decker, Chesterfield; Chas. Youngs, Brooksdale; William Jones, Zenda; D. DeCourcy, Bornholm; Geo. Thompson, Bright; Robert Gibson, Galt; R. H. Harding, Thorndale; Joseph Yuill, Carleton Place; W. O. Edwards, Rockland; Joseph Barnett, Rockland; J. J. Ferguson, Smith's Falls; Henry Glendinning, Manilla; E. E. Martin, Canning; Beverley Jeffs, Bond Head; William Linton, Aurora.

Yorkshires and Tamworths.—N. M. Blain, St. George; A. Dunn, Ingersoll; J. H. Simenton, Chatham; G. North, Marden; A. Elliott, Galt; L. F. Master, Haysville; A. C. Hallman, New Dundee; J. Bell, Amber; D. G. Hanmer, Burford; John Nichol, Hubrey; Jos. E. Brethour, Burford; H. Caldwell, Orchard; W. Elliott, Hamilton; C. C. L Wilson, Ingersoll; F. C. Fearman, Hamilton; Andrew Laurie, Wolverton; Wm. Davies, Toronto; Richard Gibson, Delaware; Henry Dedels, Kossuth; G. B. Hood, Guelph; Jos. Featherston, M.P., Streetsville; H. E Sharpe, Ida; A. F. McGill, Hillsburg; J. G. Muir, Howick, Que.; J. M. Hurley, Belleville; Geo. Gier, Grand Valley; James Stephen, Trout River, Que.; R. McLellan, Harriston; Joseph Fletcher, Oxford Mills; Robt. Nichol, Brussels; A. and F. Foreman, Collingwood; J. Y. Ormsby, Woodstock; Jas. Leach, Toronto; Wm. Howe, North Bruce: Chas. Yapp, Brantford; G. E. Day, Guelph.

Suffolks and Essex.—S. Butterfield, Windsor; Wm. Jones, Zenda; Jos. Main, Milton: David McCrae, Guelph; Jas. Anderson, Guelph; S. Lemon, Kettleby; T. C. Douglas, Galt; Wm. Elliott, Milton; Jas. Millar, Guelph.

Duroc Jerseys.—Jos. Featherston, M.P., Streetsville; Wm. Jones, Zenda; Geo. Green, Fairview; Thos. Teasdale, Concord; Jos. McGarvin, Chatham. R. H. Harding, Thorndale; D. DeCourcy. Bornholm; Wm Smith, Burford; Harry Jones, Zenda; Wm. Tape, Ridgetown; Herbert George, Crampton; F. W. Terhune, Brantford; I. O. Fraser, Fellows; W. E. Butler, Dereham Centre; Jacob E. Shibley, Harrowsmith.

Poland Chinas.—Thos. Teasdale, Concord; Jos. Featherston, M.P., Streetsville; J. H. Snarey, Croton; Jas. Main, Milton; Capt. A. W. Young, Tupperville; Geo. Green, Fairview; Wm Smith, Fairfield Plains; Wm. Jones, Zenda; Oliver Drury, Fargo; C. W. Yapp, Brantford; R. Willis, Glen Meyer.

Chester Whites—Wm. Jones, Z nda; J. C. Snell, London; Geo. Green, Fairview; D. DeCourcy, Bornholm; R Dorsey, Burnhamthorpe; R. H. Harding, Thorndale; W. E. Butler, Dereham Centre; G. B. Hood, Guelph; G. E. Day, Guelph; Thos. Teasdale, Concord; S. H. Todd, Wakeman, O.; Gideon Snyder, Jarvis; Henry Jones, Zenda; Jos. Cairns, Camlachie; Jos. Featherston, M P., Streetsville; Thos. Brooks, Brantford; J. L. Jarvis, Paris; T. A. Cox, Brantford; Herbert George, Crampton.

After the routine business was concluded, Prof. J. W. Robertson delivered an address to the members and delegates to Farmers' Institutes who were present. This address will be found in the report of the Superintendent of Farmers' Institutes for 1898-9. Prof. G. E. Day, followed with an address entitled "The Bacon Hog." This is also published in the above-mentioned report.

DIRECTORS' MEETING.

A meeting of the directors of the Dominion Swine Breeders' Association was held in the Palmer House, February 8th, 1899, at 8 p.m., the President, Mr. George Green, in the chair.

The Secretary presented his annual report which was adopted.

It was decided in order to develop a dressed poultry department of the Provincial winter show, that two-thirds of the prizes to be awarded for dressed poultry be offered by this Association, the remainder to be paid out of the receipts of the show.

Messrs. Jos. Featherston, G. E. Day and F. W. Hodson were appointed a committee to make full arrangements for conducting comparative swine experiments and to take full charge of the work, the experiments to be carried on along the lines laid down in the report of the Secretary. Arrangements will be made with reliable farmers in Ontario to feed hogs along certain lines, and when ready to kill, the packers have agreed to co-operate by paying the highest price for all hogs in the experiments, and also to make a report on the different carcasses. The object in view is to ascertain the cause of soft bacon. The executive committee, with power to add to their number, were appointed a committee from the Swine Breeders' Association to form part of a deputation to wait on the Ontario Cabinet to ask for a grant of $1,000 for the purpose of extending the interprovincial trade in pure bred live stock.

Swine Records.

It was unanimously decided that the secretary make arrangements to have two volumes of the swine records published this year, and that all members for 1899 be given the two volumes. This method will bring the pedigrees published up to date, *i.e.*, the pedigrees published at the end of any year being those received during that year. Hereafter members of the Swine Breeders' Association will receive the volume of the record issued at the end of the year for which they have been members, unless some other volume is specially asked for.

The directors also decided to increase the prizes of any exhibitor ten per cent. upon the same conditions as explained in the case of the Sheep Breeders' meeting. The entry fees for swine at the Provincial fat stock show were raised to seventy-five cents per entry. Barrows exhibiting in the pure bred classes will not require to be recorded. All that is necessary will be to forward to the secretary of the show the pedigree of the animals on the regular application forms.

The judges appointed in the swine department are as follows:

Chester Whites, Poland Chinas Duroc Jerseys and Grades.—Thos. Teasdale, Concord, and G. B. Hood, Guelph. Reserve, C. W. Yapp, Brantford.

Berkshires, Yorkshires, Suffolks and Essex, and Tamworths.—W. H. Jones, Mt. Elgin; R. H. Harding, Thorndale. Reserve, C. W. Yapp.

Sweepstake prizes to be awarded by the acting judges in both classes.

Bacon Sections.—Jas. Leach, of the Wm. Davies Packing Company, Toronto, and C. C. L. Wilson, Ingersoll.

FINANCIAL STATEMENT TO DECEMBER 31st, 1898.

Receipts.

Cash on hand from previous year as per last report	$2,256 71
Members' fees	738 00
Legislative grant	1,200 00
Record fees less commission	1,093 55
Total	$5,288 26

Expenditures.

Grants to other societies, fairs, etc. Fat Stock Show	$1,382 02
Officers' salaries	200 00
Directors' fees and expenses	67 96
Postage and stationery	68 50
Printing	653 22
Cost of reporting	1 17
Typewriting and preparing annual report	83 00
Audit of record books	5 00
Telegraph and telephone	5 70
Express	2 50
Cleaning office	1 35
Expenses re exhibition tent	3 46
Wrapping and rolling papers	5 00
Balance on account stock cars to Manitoba	24 54
Loaned on mortgage	1,000 00
Total	$3,503 42
Balance on hand	$1,784 84

Examined and found correct
this 6th day of February, 1899.

J. M. Duff, Auditor.

George Green,
President.

F. W. Hodson,
Secretary-Treasurer.

MEMBERS OF SWINE BREEDERS' ASSOCIATION.

Name.	Address.	Class.
Acland, John	Delaware, Ont	Berkshires.
Allan, E. E	Grafton, Ont	Berkshires.
Ash, Wm. R	North Ridge, Ont	Berkshires.
Anderson, J. D.	Wyoming, Ont	Berkshires.
Anderson, John A	Morgantown, Ont	Berkshires.
Agnew, Robert	Acton, Ont	Berkshires.
Aiken, Wm	Milverton, Ont	Yorkshires.
Arkell, Henry	Arkell, Ont	Berkshires.
Austin, W. R.	Sapperton, B. C	Chester Whites.
Arnold, J. B	Easton's Corners, Ont	Tamworths.
Bray, Jas	Longburn, Man	Yorkshires.
Baldwin, W. G	Colchester, Ont	Tamworths.
Blain, N. M	St. George, Ont	Tamworths.
Brandow, A. W	Walsingham Centre, Ont	Tamworths.
Bate, E. H	Brighton, Ont	Tamworths and Poland Chinas.
Baker, E. D	Amherst, N. S	Duroc Jerseys.
Blair, Wm	Ochre River, Man	Berkshires.
Baldwin, Wm	Manitou, Man	Tamworths.
Bradley, L. A	Portage La Prairie, Man	Tamworths.
Barr, David, jr	Renfrew, Ont	Yorkshires and Berkshires.
Bratt, Geo. A	Inwood, Ont	Yorkshires.
Brethour, J. E	Burford, Ont	Yorkshires.
Bell, John	Amber, Ont	Tamworths.
Bennett, Geo. & Pardo	Charing Cross, Ont	Chester Whites.
Bennett, Jos.	South Buxton, Ont	Poland Chinas.
Bennett, H. & Son	St. Williams, Ont	Berkshires.
Berdan & McNeill	Strathburn, Ont	Duroc Jerseys.
Betzner, G. D	Copetown, Ont	Yorkshires.
Brien, E	Ridgetown, Ont	Berkshires.
Birdsall, F. & Son	Birdsall, Ont	Chester Whites.
Benedict, O. J	Mount Vernon, Ont	Tamworths.
Bonnycastle, F. & Son	Campbellford, Ont	Berkshires.
Boynton, P. W. & Son	Dollar, Ont	Berkshires.
Bowles, Levi	Springfield, Ont	Berkshires.
Bow Park Co	Brantford, Ont	Berkshires.
Brown, F. W.	Portage La Prairie, Man	Berkshires.
Bowman, W. R	Mount Forest, Ont	Berkshires.
Ball, Thos	Innisfail, Alta	Poland Chinas.
Black, W. W	Amherst, N. S	Tamworths.
Bowman, T	Berlio, Ont	Chester Whites.
Ball, E. W	Hamnurg, Mich	Berkshires.
Brooks, Thos. & Son	Brantford, Ont	Tamworths.
Bowman, W. A	Elmdale, N.Y	Yorkshires.
Brown, Wm	Paisley, Ont	Tamworths.
Boyes, John, jr	Churchill, Ont	Berkshires.
Boyd, Arch	Kars, Ont	Berkshires.
Boynton, C. G	Georgeville, Que	Chester Whites.
Brown, J. Rankin	Northampton, N. B	Berkshires.
Butler, Wm. & Son	Dereham Centre, Ont	Chester Whites, Duroc Jerseys.
Burgess, Mrs. R. L	Burgessville, Ont	Berkshires.
Bull, B. H. & Son	Brampton, Ont	Berkshires.
Caldwell Bros	Orchard, Ont	Berkshires and Yorkshires.
Caverly, E	Sine, Ont	Berkshires.
Clarke, Wm	West Lorne, Ont	Poland Chinas.
Clarke, Wm	N. Wiltshire, P. E. I	Yorkshires.
Clark, J. G	Ottawa, Ont	Yorkshires.
Capes, Henry	Kertch, Ont	Poland Chinas.
Clark, J. R.	Blenheim, Ont	Berkshires.
Chalk, J. H	Calton, Ont	Chester Whites.
Cairns, Joseph	Camlachie, Ont	Chester Whites.
Carrruthers, C. J	Cobourg, Ont	Berkshires.
Campbell, D	Norwood, Ont	Berkshires.
Carter, Eliphet	Bayham, Ont	Tamworths.
Callbeck, J. W	Augustine Grove, P. E. I	Yorkshires and Poland Chinas.
Campbell, Mac	Northwood, Ont	Berkshires and Chester Whites.
Cheetham, Geo. A	Morton, Ont	Tamworths.

MEMBERS OF SWINE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
Clark, John	Orangeville, Ont	Yorkshires.
Cavanagh, Wesley	Frankville, Ont	Berkshires and Tamworths.
Campbell, D	Duntroon, Ont	Berkshires.
Chambers, Alf	Wawanesa, Man	Berkshires.
Campbell, D	Clifford, Ont	Berkshires.
Carpenter. W. S	Simcoe. Ont	Berkshires.
Campbell, C. A	Mt. Vernon, Ont	Berkshires.
Carver, E. A	Colpoy's Bay, Ont	Tamworths.
Campbell, John	Snelgrove, Ont	Berkshires.
Clark, Wm	Meyersburg, Ont	Berkshires.
Christie, Jas	Winchester, Ont	Chester Whites.
Coxworth, S	Whitby, Ont	Berkshires.
Cox, T. A	Brantford, Ont	Berkshires.
Cousins, John & Son	Harriston, Ont	Yorkshires.
Conroy, R. & W	Deschenes Mills, Que	Tamworths.
Collyer, F. J	Welwyn, Assa	Berkshires.
Cook, Jos	Maple Hill, Ont	Yorkshires.
Cowieson, J. B	Queensville, Ont	Chester Whites.
Cook, F	Parkhill, Ont	Berkshires.
Connoliy, P. J	Middleton. P. E. I	Yorkshires.
Colwill Bros	Newcastle, Ont	Yorkshires.
Coleman, T. J	Markdale, Ont	Berkshires.
Cowan, John C	Gainsboro', Assa	Berkshires.
Cole, T. J	Bowmanville. Ont	Tamworths and Yorkshires.
Chute, H. J	Somerset, N. S	Chester Whites.
Curtis, A. E	Stanstead, Que	Chester Whites.
Curtis, C. H	Warkworth, Ont	Tamworths and Poland Chinas.
Curts, Henry	Arkona, Ont	Poland Chinas.
Culp, A. S	Jordan, Ont	Chester Whites.
Coxworth, S	Dauphin, Man	Berkshires.
Coleman, Jas	St. Thomas, Ont	Poland Chinas.
Crowell, W. N	Napinka, Man	Berkshires.
Crozier, Arch	Beachburg, Ont	Berkshires.
Davis, H. J	Woodstock, Ont	Berkshires, Tamworths and Yorkshires.
Drake, S. F	Pownall, P. E. I	Chester Whites.
Dafoe. Geo	Avon, Ont	Tamworths and Poland Chinas.
Day, N	Powle's Corners, Ont	Yorkshires.
Dawson. Fred	Collingwood, Ont	Tamworths.
Davis, C. G	Freeman, Ont	Berkshires.
Darling, L. A	Morganston, Ont	Yorkshires.
Davis, J. F.	Tempo, Ont	Yorkshires.
Dawson, Wesley	Napanee, Ont	Yorkshires.
Decker, C. R	Chesterfield. Ont	Berkshires.
DeCourcey, D	Bornholm, Ont	Poland Chinas.
Demaray & Son	Strathroy, Ont	Yorkshires.
Dedels, H	Kossuth, Ont	Tamworths and Yorkshires.
Dolson, Samuel	Alloa	Berkshires.
Dyment, S	Barrie, Ont	Berkshires.
DePuy, T	Rochester, N. Y	Yorkshires.
Denison, W. S	Denison's Mills, Que	Chester Whites.
Devins, W. R	Heathcote, Ont	Berkshires.
Devlin, Wm	Brantford, Ont	Berkshires.
Dickenson. Wm	Mildmay, Ont	Berkshires.
Dickson, W. L.	Dromore, Ont	Berkshires.
Dickenson, Albert S	Franklin Centre, Que	Chester Whites.
Docl, E	Harrington, Ont	Berkshires.
Dorrance, Jas	Seaforth, Ont	Berkshires.
Donaldson, Jas	Dewittville, Que	Tamworths.
Douglas, John H	Warkworth, Ont	Berkshires.
Douglas, Hugh	Huntingfield, Ont	Berkshires.
Duthie, Jas	Melgund, Man	Berkshires.
Dunn, And	Ingersoll, Ont	Tamworths.
Drury, Oliver	Fargo, Ont	Poland Chinas.
Duch, Wm. J	Morpeth, Ont	Berkshires, Poland Chinas.
Duck, R F	Port Credit, Ont	Yorkshires.
Dunbrook, Geo. F	Woodstock, Ont	Berkshires.
Edwards, W. C. & Co	Rockland, Ont	Berkshires.
Edwards, Edwin	N. Wiltshire, P.E.I	Yorkshires.
Evans, John C	Grimesthorpe, Man	Berkshires.

MEMBERS OF SWINE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
Elliott, A	Pond Mills, Ont	Poland Chinas, Duroc Jerseys.
Elliott, A	Galt, Ont	Tamworths.
Elder, Jas	Virden, Man	Berkshires.
Empey, John	Brandon, Man	Berkshires.
Empey, M. N	Napanee, Ont	Yorkshires.
Endsley, T. L	Charleston, Ill	Tamworths.
Ewing, J. B	Dartford, Ont	Berkshires.
Frank, A. & Sons	The Grange, Ont	Suffolks.
Fraser, D. & Son	Emerson, Man	Poland Chinas.
Fraser, I. O. & Son	Fellows, Ont	Duroc Jerseys.
Fahner, Chris	Crediton, Ont	Duroc Jerseys.
Flatt, D. C	Millgrove, Ont	Yorkshires.
Frazer, Wm	Campbellville, Ont	Yorkshires.
Featherston, Jos	Streetsville, Ont	Suffolks, Yorkshires, Essex.
Ferguson, J. J	Smith's Falls, Ont	Berkshires.
Ferland, Jos. B	Three Rivers, Que	Yorkshires.
Frink, H. P	Napanee, Ont	Berkshires.
Fisher, W. & A	Benmiller, Ont	Poland Chinas, Berkshires.
Frood, D	Renfrew, Ont	Berkshires.
Fulton, John, jr	Brownsville, Ont	Tamworths.
Graham, D. A	Parkhill, Ont	Berkshires.
Gaffield, N. S	Castleton, Ont	Berkshires.
Gardner, F. A	Britannia, Ont	Berkshires.
Graham, And	Pomeroy, Man	Yorkshires.
Green, Geo	Fairview, Ont	Berkshires.
Greenwood, Thos	Douglas, Man	Berkshires and Yorkshires.
George, Thos	Mt. Elgin, Ont	Tamworths.
George, H. & Sons	Crampton, Ont	Chester Whites, Tamworths.
German, J. W	St. George, Ont	
Gemmell, J. D	Egmondville, Ont	Berkshires.
Glendinning, H	Manilla, Ont	Berkshires.
George, E. D	Putnam, Ont	Chester Whites.
Greenway, Hon. Thos	Crystal City, Man	Berkshires.
Gier, Geo	Grand Valley, Ont	Berkshires.
Gibson, R	Delaware, Ont	Yorkshires.
Gillies, A. J	Muirkirk, Ont	Chester Whites.
Gibson, Robt	Galt, Ont	Berkshires.
Gilroy, C. J. & Son	Glen Buell, Ont	Yorkshires.
Gies, Anthony	St. Jacobs, Ont	Berkshires and Yorkshires
Gibson, D. J	Bowmanville, Ont	Tamworths and Berkshires.
Golding, Henry	Thamesford, Ont	Chester Whites, Tamworths.
Golden, J. H	Amherstburg, Ont	Berkshires.
Gosney, Thos	Miami, Man	Berkshires.
Good, Thos	Brantford, Ont	Berkshires and Tamworths.
Godard, Chas. E	Cobourg, Ont	Chester Whites, Yorkshires an Berkshires.
Groat, C	Brooklin, Ont	Berkshires.
Graham, A. R	Shanty Bay, Ont	Berkshires.
Gummer, G. A	Colborne, Ont	Chester Whites.
Harding, R. H	Thorndale, Ont	Chester Whites.
Hawkins, D	Woodville, Ont	Berkshires.
Hanley, J. C	Read, Ont	Poland Chinas.
Hallman, A. C	New Dundee, Ont	Tamworths.
Hauser, I	Weisenberg, Ont	Yorkshires.
Hartman, J. W	Elmhedge, Ont	Berkshires.
Hart, Alex	Hampstead, Ont	Berkshires.
Hamilton, Daniel, V. S	Harriston, Ont	Berkshires.
Harris, Geo. N	Lynden, Ont	Berkshires.
Harvey, A. P	Kincardine, Ont	Yorkshires.
Hawkshaw, W. S. & Son	Glanworth, Ont	Tamworths.
Haste, A. C	Comber, Ont	Berkshires.
Harkness, T. J	Annan, Ont	Yorkshires.
Hart, Henry	Woodstock, Ont	Tamworths.
Henerson, W. C	Keady, Ont	Berkshires.
Herron, Henry	Avon, Ont	Poland Chinas and Chester Whites
Hyde, Geo. A	Shakespeare, Ont	Yorkshires.
Henderson, B. W	Morton, Ont	Tamworths.
Helmer, Albert	Russell, Ont	Poland Chinas.
Henry, J. R	Chater, Man	Berkshires.
Hill, Geo	Delaware, Ont	Berkshires.

MEMBERS OF SWINE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
Hood, G. B	Guelph, Ont	Yorkshires.
Honey, R	Brickley, Ont	Yorkshires.
Holmes, C. W	Amherst, N.S	Poland Chinas and Chester Whites.
Hoover, P. R. & Sons	Green River, Ont	Tamworths.
Howe, Wm	North Bruce, Ont	Yorkshires and Berkshires.
Hord, John & Sons	Parkhill, Ont	Poland Chinas, Yorkshires, Suffolks and Tamworths.
Holdsworth, R. L. & Son	Port Hope, Ont	Berkshires.
Holland, T. F	Dereham Centre, Ont	Tamworths.
Howden, John	Edgeley, Assa	Berkshires.
Howden, J. J	Peterboro', Ont	Tamworths.
Howard, W. J	Dollar, Ont	Yorkshires.
Hurley J. M. & Son	Belleville, Ont	Yorkshires and Berkshires.
Hume & Co., Alex	Burnbrae, Ont	Yorkshires.
Hurlburt, B. J	Clymer, N.Y	Yorkshires.
Hyde, G. A	Shakespeare, Ont	Berkshires and Yorkshires.
Hunter, H. A	Orangeville, Ont	Berkshires and Yorkshires.
Henderson, W	Thamesville, Ont	Tamworths.
Howard, N. H	Lynden, Ont	Duroc Jerseys.
Hoffarth, Jos	Carlsruhe, Ont	Tamworths.
Hubbard, W. W	Sussex, N.B	
Isaac, John	Markham, Ont	Berkshires.
Innes, Jas. & Son	Currie's Crossing, Ont	Chester Whites.
Jarvis, G. L	Paris, Ont	
Jeffs, E. & Son	Bond Head, Ont	Berkshires.
Johnston, A	Greenwood, Ont	Berkshires.
Johnston, John	Little Rideau, Ont	Yorkshires.
Jones, W. & H	Mt. Elgin, Ont	Poland Chinas.
Johnston, John	Underwood, Ont	Berkshires.
Johnson, F. P	Moscow, Ont	Berkshires and Tamworths.
Johnston, Ben	Rodney, Ont	Yorkshires.
Johnston, C. L	Rosedene, Ont	Berkshires.
Julian, Geo	Heathcote, Ont	Berkshires.
Kneal, J. A. and F	Holbrook, Ont	Poland Chinas.
Keough, J. E	Rockwood, Ont	Yorkshires.
Ker, J. G	Woodburn, Ont	Berkshires.
Kenny, J. W	Heathcote, Ont	Yorkshires.
Keana, Wm	Stratford, Ont	Berkshires.
Kennedy, Hugh	McKinlay, Ont	Yorkshires.
Kelly, John	Shakespeare, Ont	Berkshires.
Kitching, John	Corwhin, Ont	Berkshires.
Kipp, E. A	Chilliwack, B.C	Berkshires.
Kipp, Henry	Chilliwack, B.C	Duroc Jeaseys.
King, Wm	Carnduff, Assa	Berkshires.
King, Wm. Penn	Oakwood, Ont	Berkshires and Yorkshires.
King, Oliver	Wawanesa, Man	Berkshires.
Kitson, Wm	Burnside, Man	Berkshires.
Lang, R. L	Oak Lake, Man	Berkshires.
Lawrie & Bros., R. J	Wolverton, Ont	Tamworths.
Latimer Bros	Arkport, N.Y	Yorkshires.
Lahmer, John	Carrville, Ont	Berkshires.
Lamb, Alfred	Foreman, Ont	
Lemon, S	Kettleby, Ont	Berkshires.
Leatherdale, E	Morden, Man	Berkshires.
Lee & Sons, Jos	Durham, Que	Chester Whites and Duroc
Lee, J. W	Simcoe, Ont	Yorkshires.
Livingston, J. A	Grattan, Ont	Tamworths.
Little, Thos., jr	Kirkwall, Ont	Yorkshires.
Lloyd, E. A	Stouffville, Ont	Berkshires.
Lloyd, And	Edgley, Ont	Berkshires.
Lloyd, Moses	Hazzard's Corners, Ont	Duroc Jerseys.
Lyons, S. K	Norval, Ont	Berkshires.
Martin, E. E	Canning, Ont	Berkshires.
Martin, R. G	Marysville, Ont	Yorkshires and Berkshires.
Mark, Geo. H	Oakwood, Ont	Berkshires.
Master, L vi	Haysville, Ont	Tamworths.
Martin, W. H	Warden, Que	Berkshires.
Maloney, F. A	Chapeau, Que	Yorkshires.
Mairs, J. & G	Oakridges, Ont	Berkshires.
Master, J. F	New Dundee, Ont	Yorkshires and Tamworths.

MEMBERS OF SWINE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
May, W. A	Creemore, Ont	Yorkshires and Tamworths.
Martin, S. Edgar	Bloomfield, Ont	Duroc Jerseys.
Major, W	Whitevale, Ont	Tamworths.
Mallory, A. E	Colborne, Ont	Berkshires.
Matthews, R. J	Durham, Ont	Berkshires.
Meyer, John	Kossuth, Ont	Berkshires.
Meredith & Dunlop	Thorncliffe, Ont	Poland Chinas.
Miller, E. D	Picton, Ont	Tamworths.
Moody, R	Guelph, Ont	Berkshires.
Morrison, Alex	Carman, Man	Berkshires.
Morrow, R. O	Hilton, Ont	Tamworths.
Morgan, E. H	Stanbridge Station, Que	Berkshires.
Moody, Ed	Humber, Ont	Tamworths.
Moore, R. & Son	Rosedene, Ont	Berkshires.
Morrill, F. A	Way's Mills, Que	Berkshires.
Mullen, Jas. A	Cypress River, Man	Berkshires.
Mutch, J. F	Pilot Mound, Man	Berkshires
Murray, G. H	Innerkip, Ont	Berkshires.
Murphy, R. G	Elgin, Ont	Berkshires.
Myles, J. A	Thornburg, Ont	Tamworths and Yorkshires.
Muirhead, John	North Tryon, P.EI	Tamworths.
McAllister, Wm	Varna, Ont	Berkshires.
McCrae, David	Guelph, Ont	Yorkshires.
McCann, N	Vankleek Hill, Ont	Poland Chinas.
McKay, J. F	Parkhill, Ont	Poland Chinas.
McCrae, Wm	Guelph, Ont	
McAvoy, C. C	Atha, Ont	Berkshires.
McFarlane, Mungo	Cowal, Ont	Tamworths.
McMartin, Alex	Evelyn, Ont	Yorkshires.
MacKenzie, John	Presque Isle, Ont	Tamworths.
McEchern Bros	Argyle, Ont	Chester Whites.
McKenzie, R	High Bluff, Man	Berkshires.
McEwen, J	Kertch, Ont	Berkshires.
McEwen, Jas	Glendale, Man	Berkshires.
McKenzie Bros	Scotch Block, Ont	Berkshires.
McLellan, W. D	Harriston, Ont	Berkshires.
McPherson, Alex	Rutherford, Ont	
McNish, C. H	Lyn, Ont	Yorkshires.
McKnight, J. S	Epping, Ont	Yorkshires.
McGill, J. A	Neepawa, Man	Berkshires.
McIntosh, Alva	Winchester Springs, Ont	Poland Chinas.
McIntyre, D. J	Lindsay, Ont	Tamworths.
McGillivray, J. W	Sumas, B.C	Tamworths.
McWilliams, J. R	Mt Vernon, Ont	
McGill, D. E	Hillsburg, Ont	Berkshires.
McIntyre, D. J	Whitby, Ont	Tamworths.
McGill, G. B	Middleton, N. S	Tamworths.
McDonald, R. N	Morganston, Ont	Berkshires.
McDonald, W. R	Ridgetown, Ont	Tamworths.
McDougall, H	Guelph, Ont	
McDonald, J. B	Muirkirk, Ont	Berkshires and Yorkshires.
McCutchen, H	Glencoe, Ont	Duroc Jerseys.
McClure, T. A	Meadowvale, Ont	
McMullen, R. B	Blytheswood, Ont	Poland Chinas.
McDowell, H. T	Shawville, Que	Chester Whites.
Newstead, J. D	Preston, Ont	
Neil, F. H	Lucan, Ont	Chester Whites and Berkshires.
Nesbitt, W. H	Eastwood, Ont	Chester Whites.
Newall, J. K	Cramp ton, Ont	Tamworths.
Nichol, Robt	Brussels, Ont	Yorkshires.
Nichol, John C	Hubrey, Ont	Tamworths.
North, Geo	Marden, Ont	Tamworths.
Nurse, C	Humber Bay, Ont	Tamworths.
Odell, W. H	Belmont, Ont	Tamworths.
Oke, Francis W	Alvinston, Ont	Chester Whites.
Owens, Hon. W	Montebello, Que	Yorkshires and Tamworths.
Oliver, Wm	Komoka, Ont	Berkshires.
Ormsby, J. Y	Woodstock, Ont	Yorkshires.
Plaunt, X	Northcote, Ont	Berkshires.
Page & Sons, J. E	Amherst, N.S	Poland Chinas and Tamworths.

MEMBERS OF SWINE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
Parlee, M. H	Sussex, N.B	Berkshires.
Patch, C. W	Brome, Que	Chester Whites.
Patterson, Wm	Churchil, Ont	Berkshires.
Pettit, W. G	Freeman, Ont	Berkshires.
Pearson & Son, S. J	Meadowvale, Ont	Berkshires.
Patch, Frank H	Brome, Que	Berkshires.
Pangman, Samuel	Vallentyne Ont	Berkshires
Park & Son, John	Burgessville, Ont	Duroc Jerseys.
Parks, E. and N.	Oriel, Ont	Duroc Jerseys.
Park, Henry	Norwich, Ont	Poland Chinas.
Parr, D. W	Tintern, Ont	Chester Whites.
Parsons, Wm	Woodstock, Ont	Berkshires.
Pike, John	Locust Hill, Ont	Yorkshires.
Potter, A. B	Montgomery, Assa	Yorkshires and Berkshires.
Pool, E	Hartington, Ont	Yorkshires.
Prouse, Wm	Ingersoll, Ont	Tamworths.
Pomeroy, W. J	Midmay, Ont	Yorkshires.
Ritchie, Jas	Belmore, Ont	Berkshires.
Racey, John	Lennoxville, Ont	Berkshires.
Revell, H	Ingersoll, Ont	Tamworths.
Reed & Co., R	Hintonburg, Ont	Berkshires and Tamworths.
Reid, Isaac	Ardtrea	Berkshires.
Ritchie, W. G	Greenock, Ont	Tamworths.
Richardson, J. A	South March, Ont	Tamworths.
Richardson, H. F	Kerwood, Ont	Berkshires.
Richardson, R. H	South March, Ont	Chester Whites.
Rightmyer, S. D	Peterboro', Ont	Berkshires.
Rogers, L	Cooksville, Ont	Yorkshires.
Rogers, Geo. F	Plumas, Man	Berkshires.
Row, W	Avon, Ont	Tamworths.
Ross, A. W	Douglas, Ont	Yorkshires and Berkshires.
Ronson, J. W	Acacia, Ont	Berkshires.
Robertson, D. A	Logoch, Man	Berkshires.
Rusnell, F	Cedarville, Ont	Berkshires.
Russell, Jas. A	Precious Corners, Ont	Berkshires.
Ruston, J. F	Woodslee, Ont	Berkshires.
Runciman, Geo. A	Warkworth, Ont	Chester Whites.
Row, F	Belmont, Ont	Tamworths.
Roberts, Harry	Sharbot Lake, Ont	Yorkshires.
Robertson, H. P	Beachburg, Ont	Yorkshires and Tamworths.
Robertson, A. J	Martintown, Ont	Tamworths.
Robertson, R	Nappan, N.S	Tamworths.
Rudd, W. J	Eden Mills, Ont	Berkshires.
Stratford, Joseph	Brantford, Ont	Chester Whites.
Shanks, J W	Rapid City, Manitoba	Yorkshires.
Shaw, J. H	Simcoe, Ont	Berkshires and Chester Whites.
Snarey & Sons, B	Croton, Ont	Poland Chinas and Yorkshires.
Saunderson, Thos	Holland, Man	Berkshires and Yorkshires.
Small, A., jr	Melbourne, Ont	Berkshires.
Shaver & Sons, Sills	Winchester Springs, Ont	Yorkshires.
Shannon & Son, Jos	Cloverdale, B.C	Berkshires.
Sargent, F. O	Eddystone, Ont	
Snell, J. C	Snelgrove, Ont	Berkshires.
Snell & Bro., J. G	Snelgrove, Ont	Berkshires.
Shearer, W. C	Bright, Ont	Berkshires.
Spencer, W. H	Guilds, Ont	Berkshires.
Semple, J. R	Brule, N.S	Berkshires.
Seymour, R. F	Essex, Ont	Berkshires.
Snyder, Gideon, jr	Jarvis, Ont	Berkshires and Chester Whites.
Semple, John	Tottenham, Ont	Duroc Jerseys.
Snell, R. P	Snelgrove, Ont	Berkshires.
Steffler, A	Formosa, Ont	Tamworths.
Smith, W. M & J. C	Fairfield Plains, Ont	Duroc Jerseys and Poland Chinas.
Simmons & Quirie	Ivan, Ont	Berkshires.
Shrigley, John	Allandale, Ont	Berkshires.
Siefert, J. H	North Bruce, Ont	Berkshires.
Smith & Sons, J	Duntroon, Ont	Berkshires.
Shibley, W. J	Harrowsmith, Ont	Berkshires.
Simenton, J. H	Chatham, Ont	Tamworths.
Sipirell & Carrol	Carholme, Ont	Berkshires.

MEMBERS OF SWINE BREEDERS' ASSOCIATION.—*Continued.*

Name.	Address.	Class.
Smith, H. D	Compton, Que	Yorkshires and Tamworths.
Stirtinger, F. H	Fenwick, Ont	Poland Chinas.
Simpson Bros	Ridgetown, Ont	Duroc Jerseys.
Simpson, Jos	Mooresville	Chester Whites.
Shibley, J. E	Harrowsmith, Ont	Duroc Jerseys.
Shipman, G. H	Cannington, Ont	Berkshires and Tamworths.
Smith, A. B	Morrisburg, Ont	Berkshires and Tamworths.
Smith, James	Harrietsville, Ont	Tamworths.
Spicer Bros	Yeovil, Ont	Yorkshires.
Smith, W. J	Kilsyth, Ont	Yorkshires and Berkshires.
Snowball, R. A	Chatham, N.B	Chester Whites.
Spotswood, W. A	Kemptville, Ont	Berkshires.
Scott, Samuel	Stonewall, Man	Berkshires.
Scott, Robt	Calf Mountain, Man	Berkshires.
Stover, Samuel	Puce, Ont	Berkshires.
Smythe, R. L	Fargo, Ont	Poland Chinas.
Smyth, J. M	Chatham, Ont	Poland Chinas.
Steacy, R. G	Lyn, Ont	Yorkshires.
Smith, J. H	Highfield, Ont	Berkshires.
Taylor, J. & H	Richmond Sta., Que	Yorkshires.
Tape Bros	Ridgetown, Ont	Duroc Jerseys.
Taylor, A. J	Glencoe, Ont	Chester Whites.
Trann, W. R	Crystal City, Man	Poland Chinas.
Teasdale, Thos	Concord, Ont	Berkshires.
Teverton, Chas	Belleville, Ont	Tamworths.
Terrell, A	Wooler, Ont	Yorkshires.
Terhune, F. W	Brantford, Ont	Duroc Jerseys.
Trigger, C. W	St. Thomas, Ont	Berkshires.
Tierney, J. H	Norham, Ont	Chester Whites and Tamworths.
Twist, J. B	Woodburn, Ont	Tamworths.
Timms, G. A	Ralphton, Man	Berkshires.
Thompson, Geo	Bright, Ont	Berkshires.
Thorndike, Wm	Oakwood, Ont	Tamworths.
Thompson, S. J	Carberry, Man	Berkshires.
Thompson, Wm	White Rose, Ont	Berkshires.
Topley, Wm	Morden, Man	Poland Chinas.
Thompson, Wm	Longford Mills, Ont	Berkshires.
Tumelty, W. J	Madoc, Ont	Duroc Jerseys.
Uglow, Wm	Port Hope, Ont	Berkshires.
Vance, R	Ida, Ont	Berkshires.
Vance, Ed	Emerson, Man	Berkshires.
Vrooman, A	Carthage, N.Y	Yorkshires.
Watt, J. & W. B	Salem, Ont	Berkshires.
Warrilow, John	Owen Sound, Ont	Chester Whites.
Walter, John	Saltford, Ont	Berkshires.
Watson, A. J	Castlederg, Ont	Berkshires.
Waterworth, J. C	Wood Green, Ont	Berkshires.
Walter, Jas	Rosser, Man	Berkshires.
Wallace, R. H	Antrim, Ont	Berkshires.
Webster, R. A	Andrewsville, Ont	Poland Chinas.
Wilson, W. C	East Oro, Ont	Yorkshires.
Wright, C. J	Dixville, Que	Berkshires and Poland Chinas.
White, R. J	Colinville, Ont	Yorkshires.
Wilson, Mrs. A. J	Pittsfield, Ohio	Yorkshires.
Willis, jr., R	Glen Meyer, Ont	Poland Chinas.
Wrigley & Fox	Turgoose, B.C	Berkshires.
Wright, Robt	Binbrook, Ont	Tamworths and Berkshires.
Wilson, J. H	Mt. Vernon, Ont	
Wiley, Nelson	Wisbeach, Ont	Tamworths.
Wylie Bros., R. M	Cardinal, Ont	Berkshires.
Wright, J. H	Red Deer, Alta	Tamworths.
Yuill & Sons, Jos	Carleton Place, Ont	Berkshires.
Young, F. P	Rivard Corner, Que	Poland Chinas.

APPENDIX I.

THE ONTARIO PROVINCIAL FAT STOCK AND DAIRY SHOW, 1898.

By Richard Gibson, Delaware.

"He who by farming would get rich
Must plow and sow and dig and sich;
Work hard all day, sleep hard all night,
Save every cent and not get tight."

So wrote Josh Billings. He was the philosopher of his time and place. The sentiment of the above lines may be easily read, and true they are. The man who undertakes to get rich at farming, by plowing and sowing, will indeed need to work hard and save everything, but the man who devotes his energies to growing fat cattle, sheep and swine is certainly removed from the above arraignment. As I wandered around the building at the Brantford show, the couplet kept coming to mind,

"And as for cattle, one yearling bull
Was worth all Smithfield market full
Of the golden bulls of Pope Gregory."

Without dispute the late show surpassed anything of the kind heretofore attempted. No such an exhibit of swine was ever before nearly approached, and the steers and wethers were also particularly good. Other years outstanding winners were to be found in many of the classes, this year nothing had a mortgage upon the prize money, and never were the premiums so closely fought for. The attendance was greatly increased, and the receipts must be gratifying to the executive as well as to the citizens of Brantford, who may be said to have pledged themselves that the show should be a success. The building under whose roof the show was held was the Grand Trunk Railway repair shops, given without rent or hire. During the week several live stock organizations held their annual meetings, elected officers, etc.

Amongst the number may be mentioned the American Oxford-Down Record Association, this I believe being the first time that the annual meeting has been held out of the State of Ohio. The American Leicester Breeders' Association, having headquarters at Cameron, Ill., also paid us the honor to hold their annual meeting during our show The Dominion Swine Breeders' Association also met on Friday night and held an enthusiastic public meeting. After the routine work of electing officers, etc., Messrs. Chester Fearman, of the F. W. Fearman Co., Hamilton, and Wm. Leach, Toronto, (of the Wm. Davies Packing Co.,) delivered (and illustrated by sides of pork) addresses containing the most practical information, and valuable because practical, that has ever been presented to a gathering at the fat stock show.

Last year we had to chronicle the advent of an American aspirant to sweepstake honors, this year no such brave antagonist faced the judges, but if the stock remained within their stalls, never has our shores been invaded by such a representative body of American stockmen as upon this occasion. From along the border there were so many that it would be impossible to name them. From "down east" along the New York

frontier to Buffalo they came, thence along the lakes from Ohio, Indiana, Iowa, Illinois, Wisconsin, Michigan, Nebraska, Minnesota, Wyoming and Oregon came they. Only the Atlantic and Pacific oceans seem to limit the sphere of influence of this Association. The Hon. Sydney Fisher, Ottawa, and Hon. John Dryden, Toronto, were in attendance. Prof. Curtiss, Ames, Iowa, gave an admirable address, thoroughly practical and a model of incisive speaking. Geo. McKerrow, Esq., Wisconsin, also favored with one of his admirably conceived and characteristic speeches. There were others and many of them, but I must not forget the Hon. A. S. Hardy, who proved the brightest and most satisfactory chairman for a gathering such as the one on Wednesday evening.

The officers were on hand early and late, the energetic secretary was ubiquitous, and nothing escaped his notice or attention. One suggestion, and then to our report. Another year the judging rings must be kept clear. To do that some means must be provided so as to give the anxious crowd an opportunity to see what is going on, and to my mind this was one of the interesting features of the week. Never need one fear about the ultimate destiny of the show as long as the crowds can be attracted as at Brantford, who take so much interest in the placing of the awards. It is a healthy sign.

To the cattle classes. "A filthy beast, sir! Why a cow is one of the most agreeable of all animals. Everything about her is wholesome and useful. We get odour from her breath. She supplies our table with meat and butter and cream and cheese, and I assure you, sir, I would rather eat a cow than a Christian."—Roland Hill.

In the Shorthorn classes for steers two years old, Matt. Wilson, Fergus, won first, with a capital white by "Sittington Chief." He was entirely worthy of his place, having a great loin and back and was decidedly the thickest steer on exhibition; very cleverly fed and well brought out was he. What a magnificent bulk he looked when he came out for championship honors! No lady in the land could have had her toilet more carefully attended to than had "Lord Minto," and the sheen on his pure white coat glistened and changed tints like unto a pearl. His competitors though good were fairly beaten. They were indeed bred in the purple, as their sire "Guardsman" was also the sire of "St. Valentine," the gallery pet at some of the State fairs in the United States last year. The next class produced another white for first, Harry Smith's winner of last year as a calf. He has not grown quite as much as one would have expected, and that seeing he is brother to the champion of last year who certainly could not be blamed for lacking size. Quality was pronounced, and as both a butcher's and feeder's steer there was not a better, perhaps excepting the yearling Angus. His competitors were very much larger and out of class as yearlings and require no comment. Steer calves were a poor class, and now that prices have improved for bulls we need not expect to see so many good thoroughbred steers on exhibition. Amongst the females but little can be said, except that it is a matter of congratulation that they are not at a fat stock show, and to chronicle those that are would be doing the owners little good. I must not pass, however, Fried's two-year old. She was thick fleshed, and an outstanding winner, with, however, a coarse shoulder. Herefords were represented by one solitary individual, and the tale is soon told. He should have "gone to Texas" when young. Amongst Angus, Walter Hall had an excellent yearling; last year he was the "crack" calf. But alas! His chances are, I am afraid, gone. Mr. Hall has been too generous a feeder, and Lucretius too appreciative a boarder, with the result that he has been carried off his feet. He may come right; I hope he will. Galloways made a better show than usual; not that they were in fat stock show condition—they were not. I have seen fat Galloways when Mr. Keogh showed, but seldom since. Their curly lustrous coats, however, captured all hearts, and they really were one of the attractions of the cattle classes. I could not secure a list of awards but particularly noticed a heifer of Thos. Lloyd-Jones, a calf of Robt. Shaw's and of D. McCrae's. In Devons, Mr. Rudd was again to the fore, and in competition with the Galloways won in most of the older classes.

GRADE CATTLE.

These classes attract the most attention and are really the ones that prove what breed is best adapted to Canadian agriculture. It is to the breeders of these cattle that we must commit our reputations as progressive stockbreeders abroad. We are there judged by the stock we put upon the market, not by the thoroughbreds we may buy and show at our home Fairs. It is upon our commercial cattle the verdict is pronounced, and the question asked what are you doing with your thoroughbred stock? If they are merely playthings for the rich, and the country at large is reaping no benefit from them, and the ordinary commercial cattle are not improved by their use, then they are of little value. And this is the final test of all the registered beef breeds. What are they doing for the country? It does not require an extraordinarily brilliant man to read the lesson that may be learned at this show. I will put a question that cannot be answered, but it may lead to thought. If all the commercial cattle that have been sold from Ontario since last Fat Stock Show had been as well fed, and had the same class of bulls for sires as had the grades on exhibition at Brantford, how much would be added to the wealth of the country? In the two year old steer class John Campbell led off with a grade by a son of "Indian Chief." He was second last year. Jas. Leask showed two good ones, both sons of Moneyfuffle Lad (sic a name). In yearling class J. Leask was first and third, the white proving the conqueror, though the roan had beaten him elsewhere; but the decision was right. "Tom" Russell separated them with a thick fleshed roan and white. The first prize calf was the best that has been out for years, and one hard to criticise. He is a red. I mention this particularly to show the color "faddist" what a "Will O' the Wisp" he is following. This red calf is by a bull nearly white with a red neck, his dam a roan, and yet he is a red. This is the best calf seen for years, the only criticism allowable is a slight bareness on shoulder blade, and again, is he too sweet? Fried also showed three extra ones, all red, and I am inclined to think there is a dark horse in the lot. Here I wish to call attention to a point which I hope may be carried out in the future. Mr. Fried is the only one to fill out the entry papers so that the catalogue can give information of the breeding. He gives in all his entries the sire's name and Herd Book number. How gratifying to carry home a catalogue containing the name and Herd Book number of sires and work out the winning strains. It is of great importance, and I hope this hint may not be thrown away.

Cows and Heifers. Up to this all the winners were Shorthorn grades. In the three year old class Jas. Bowman was an easy winner with an Angus-Shorthorn cow. She was large, evenly fleshed, not a sign of blubber. Class under three years dished up a hot lot of heifers. Jas. Leask led off with a cracker, about as correct in outline and finish as a grade could be expected to be. Stafford used to say, "They always savored a little of the scullery." No pure bred here, however, could beat her. Fried here sent forward a capital white which was easily second, and not disgraced. Yearling class again saw Leask to the front, with Campbell second. The championship was soon settled. It finally lay between J. Campbell's grade and Wilson's thoroughbred; the former won judging from the butcher's standard. He had a greater proportion of high priced cuts in percentage to the low priced, than any of his competitors. Were the prizes, however, to be awarded entirely on those grounds my opinion is Walter Hall's Angus would outdress any other, and in Chicago would command fifty cents per hundred more than any animal in the ring. A breeder would have gone for Wilson's pure bred without doubt, as he was more symmetrical, thicker fleshed, and carried perhaps 250 more pounds below—low priced meat I admit, but when the feeder sells there is so much more and it has to be paid for. So here is the situation: suppose you were judge, place the ribbons, my reader, to suit your own views. The classes were well judged, and the awards were all placed from a butcher's point of view. At a Fat Stock Show this is right and the good work of the judges should be recognised.

SHEEP.

"But gie them guid cow-milk their fill,
Till they be fit to 'fend themsel';
And tent them duly e'en and morn
Wi' teats 'o hay, and ripps o' corn."—*Burns.*

Cotswolds made a pretty display. As usual they were admired by the ladies whom I heard pronounce "they are just lovely." Messrs Park & Son carried off most of the honors, with Geo. Allen playing a good second hand. Lincolns.—This year a new competitor had the audacity to compete and got two notices. It was needless to say that Gibson & Walker and W. Oliver were the exhibitors outside of W. West, and the honors rested with the former. Leicesters —Another competitor appeared outside the usual complement in these classes, and won first in shearling ewe class, with a pretty nearly perfect specimen. We refer to J. M. Gardhouse. Alex. Smith sent forward three very close runners up. In Lambs J. Kelly won 1st, and 2nd with Gardhouse at his heels. In wethers Orr & Lillico maintained their reputation Oxfords put up a good show, the old stand bys—Smith Evans and J. H. Jull, of course made their usual display but a new arrival in the ranks must be announced in the person of Mr. A. Elliott, and as he won 1st in one section we would echo the sentiment, more power to his enterprise. It will be a sorry day for the Fat Stock Show should it ever get abroad that only old professional show yard habitues have a chance to win. So I feel like offering officially to every young aspirant a gladsome welcome, and here let me say there are none of the "Old Guard" but will welcome a recruit and give him all help necessary. Those who would not do so are too selfish to be capable of much injury. I go out of my way here to announce that the Associations have no pets, and that all have an equal chance. Shropshires, as usual made a good exhibit. In the female classes only three competitors were to be found. J. Campbell, Messrs. Hanmer and W. H. Beattie. Yearling ewes found the former first and second, Hanmer third; Ewe lambs, Hanmer second and third, Campbell first. In the wether classes two more competitors put in an appearance, R. Gibson and W. E. Wright. These gentlemen, together with Campbell, Hanmer, and Beattie, put up one of the sensational rings of the Show. Eventually the ribbons were placed first and fourth to Hanmer, Gibson second and third, with Wright fifth. Wether lambs Gibson first and third, Hanmer second, Beattie fourth, Campbell fifth. Pens of three, Gibson first, Hanmer second, Wright third. This is the fourth year in succession that Gibson has won for wether lambs in Canada and in the United States. Southdowns.—Shearling ewes were a capital class, in which Jackson led with a grand ewe, and which was afterwards pronounced the sweepstakes' winner; second and third went to Telfer Brothers on a beautiful pair. Ewe lambs again found Jackson to the front, closely followed by T. C. Douglas second, Simenton third. In wether lambs Telfer first and third, Wright getting in second. The wether lambs were the strongest perhaps in the building, Jackson eventually winning first and second, whilst Telfer Brothers captured third. Dorsets —Harding won all along the line, with Bowman playing a second string; Wright was also on the list. Hampshires and Suffolks were represented by two exhibitors. The prize list will tell the tale, showing Mr. Rudd as the principal prize winner Grades and Crosses were as usual the most interesting exhibit in the sheep classes. The various breeds here meet on common ground, and the question as to what breed is best adapted to improve the ordinary stock of the country while unsolved, still gives every visitor a chance to see the results of certain crossing, and though the judges' awards may not entirely coincide with his own, the opportunity is offered here to study the comingling of the blood of the various mutton breeds, so that a student may adopt the line that seems to him most suitable to his surroundings, feed, market, etc. Such a display cannot be found on this continent outside of the Ontario Provincial Fat Stock Show, and as an object lesson the grade classes are perhaps the most valuable and interesting of the Show. The Prize List is referred to as showing the winning flocks. Shropshire grades make as usual the most successful showing, while Leicesters make a strong running up.

Swine.

"The hog loveth a cheerful giver."— *Coburn.*

As regards this department of the show it is indeed increasing not only in exhibits but in interest yearly, not step by step but by bounds and jumps. This year there were over a hundred more entries than last year, and two hundred more than the previous year. As usual the Yorkshires and Berkshires and Tamsworths led, but the competition is so close that it would be invidious to compare breeds or breeders. The big old fashioned stags and sows that have occasionally won were not in evidence this year on the prize list; blubber is no longer at a premium, and the lessons taught by the expert bacon curers are bearing fruit. The lectures and talks in connection with the dressed carcasses were very instructive, and it was one of the interesting features of the Show.

The Bacon Hog. A very interesting feature in the Swine Department was the awards made by the expert judges, Messrs C. Fearman, Hamilton, J. Leach of the Wm. Davies Co., Toronto, and C. W. Yapp, Brantford, on "Export Bacon Hogs." Their awards were not always as the outsiders would have placed them; herein was the lesson that should prove so valuable. The judges were practical men, thoroughly conversant with the bacon trade, and able to explain their reasons for giving the prizes as they did, and we venture to say many went home with a clearer conception of what was required in a bacon hog than they before possessed. In Berkshires there were two competitors; while the exhibits were good specimens, they were too heavy and fat for an ideal baconer. In Yorkshires there were three exhibitors, all making a capital show, five pens being in evidence. This was a close contest between Messrs. Featherston and Brethour for first place. After wrestling a long time over the pens the former was awarded the ribbon. Chester Whites,—four competitors entered the lists and made a most creditable show, with six entries. I must refer the reader to the prize list as to the names of the various winners; it is useless repeating them here. Tamworths were represented by four breeders with five entries. As was expected, they made a fine display. Poland Chinas had two competitors; they were of the "stout" order. Duroc Jerseys had four sanguine representatives. Suffolks and Essex were represented by two exhibitors. To say that the Suffolks were bacon hogs would be to draw upon one's imagination, though they were fair representatives of the breed. One pen of Essex was of very superior quality. The grades and crosses were perhaps the most interesting to many. Here the Tamworths gained the laurels, first going to what looked like a pedigreed Tamworth, 2nd, to Tamworth-Duroc Jersey, 3rd, Tamworth-Berkshire. There were twelve exhibitors who made entries in this class. For the four best of any breed there were twenty-three exhibitors according to the catalogue, and the excitement was intense while the judges were at work. Eventually the Yorkshires came out ahead with flying colors, winning 1st, and 2nd, while a Tamworth grade was 3rd. This was perhaps the most coveted prize offered this year, being the Prince of Wales Prize of $50 which is given annually for prizes in live stock, the balance of $75 was made up by the three principal packing companies.

The slaughter test requires more than a passing word. It is the first time a systematic test has been tried in Canada, and the Association deserves great credit for inaugurating such, and we trust this is only the entering wedge, and what has been so successfully accomplished with the swine may be equally so with sheep and cattle. There were eighteen pairs slaughtered and unfortunately the catalogue only gives the names of exhibitors, not the breed or grade, Mr. Featherston, who showed a pair of grade Yorkshires, being the only one to give this information. Just as "all coons look alike" to some, so all dressed hogs look much alike to the writer, while they may be black or red or white while alive, the scald removes all color. We learned, however, unofficially that 1st went to Tamworth grades, 2nd Tamworth, 3rd Tamworth, 4th Berkshire, 5th Yorkshire grade. These, or a portion of the dressed carcasses, were used by Messrs. Fearman and Leach to illustrate the talk they gave on "The Bacon Hog". Probably no more interesting lecture was ever given at a stock show, and, with the sides to illustrate it, was quite one of those innovations that our energetic Secretary is continually springing upon us.

LIST OF PRIZE WINNERS.

CATTLE.

Shorthorns.

Steer, two years and under three. Three entries.

1. Matt. Wilson, Fergus, Lord Minto; sire, Sittyton Chief, 17060; dam, Roan Lady, 24755.
2. J. R. Snyder, Humber, Highfield Rover; sire, Guardsman, 18956; dam, Verbena's Blossom, 19251.
3. J. R. Snyder, Humber, Windham; sire, Guardsman, 18956; dam, Rese's Fancy, 19247.

Steer, one year and under two. Four entries.

1. H. Smith, Hay, Free Trade, 25691; sire, Abbotsford, 19446; dam, Fragrance, 22729.
2. J. Fried & Sons, Roseville, Honest Billy; sire, Lord Abbott, 20707; dam, Blenheim Lass, 14010.
3. Wm. Cowan, Galt, Duke of Cambridge, 25715; sire, Duke of Brant 5th, 19554; dam Red Rose of Colonus, 14308.

Steer, under one year. Two entries.

1. J. Oke & Sons, Alvinston, Scottish Leader; sire, Scottish Leader, 21658; dam, Red Rose, 28720.
2. J. Fried & Sons, Roseville, Wild Bill; sire, Lord William, 24315; dam, Sunflower, 19205.

Cow or heifer, three years and over. Two entries.

1. J. Oke & Sons, Alvinston, Red Rose, 28720; sire, Roy Vincent, 13423; dam, Lady Peerless, 15702.
2. F. Martindale, York, Queen Anne, 29031; sire, Aberdeen, 18949; dam, Queen Avondale, 24607.

Heifer, two years and under three. Two entries.

1. J. Fried & Sons, Roseville, Roan Lilly, Vol. XV.; sire, Lord Abbott, 20707; dam, Gold Lily, 16265.
2. J. Oke & Sons, Alvinston, Lily of Alvinston, 30549; sire, Scottish Leader, 21658; dam, Euphemia M. 17533.

Heifer, under two years. Two entries.

1. J. Oke & Sons, Alvinston, Fair Queen 5th, Vol. XV.; sire, Scottish Leader, 21658; dam, Fair Queen. 24199.
2. J. Oke & Sons, Alvinston, Lady May 2nd, Vol. XV.; sire, Scottish Leader, 21658; dam, Lady May 21169.

Special Prizes by the Dominion Shorthorn Breeders' Association.

Prizes for steers were duplicated by the Dominion Shorthorn Breeders' Association.

Herefords and Polled Angus.

Steer or heifer, two years and under three. Two entries.

1. John Brown, Galt, Fairy 2nd, 1233; sire, Lord Ingleside, 870, dam, Fairy, 772.
2. James Bowman, Guelph, Ian of Tweedhill, 933; sire, Prince of Tweedhill, 14409; dam, Lady Kyma, 17607.

Steer or heifer, one year and under two. Two entries.

1. Walter Hall, Washington, Robin, 325; sire, Lucretius, 146; dam, Newtona, 188.
2. James Bowman, Guelph, Elm Park Mayflower 27224; sire, Lord Aberdeen 2nd, 19810; dam, Kyma of Tweedhill, 17606.

Steer or heifer, under one year. Three entries.

1. Walter Hall, Washington, Newtona, Promise, 29662; sire, Lucretius, 17109; dam, Newtona, 12903.
2. James Bowman, Guelph, Elm Park Belle, 30210; sire, Lord Aberdeen 3rd, 20824; dam, Heather Belle, 22610.
3. James Bowman, Guelph, Elm Park Kyma 7th, 30211; sire, Lord Aberdeen 3rd, 20824; dam, Bowman's No. 1, 22689.

Cow or heifer, three years and over. Four entries.

1. H. McDougall, Guelph, Hyman's Lassie 22607; sire, Bognie, 8245; dam, Kyma, 5500.
2. James Bowman, Guelph, Mysie 2nd of Verulam, 5354; sire, Ermine Bearer; dam, Mysie of Verulam.

Galloways and Devons.

Steer or heifer, two years and under three. Six entries.

R. R. Rudd, Eden Mills, Turk; sire, Will B., 1034; dam, Beauty Budd, 1021.
R. R. Rudd, Eden Mills, Cherry B., 1020; sire, Tom, 1031; dam, Beauty 2nd, 1032.
David McCrae, Guelph, Lenora Lila, 12800; sire, College Boy, 10395; dam, Lila of Guelph, 10288.

Steer or heifer, one year and under two. Five entries.

1. Thos. Lloyd-Jones, Burford, Blanch of the Oaks, 13573; sire, Marquis of High Park, 10799; dam, Blanch of Kells, 10385.
2. David McCrae, Guelph, Maid Minnie, 12952; sire College Boy, 10395; dam, Maid Marian B., 9750.
3. A. M. & Robt. Shaw, Brantford, Annie M. of H. P., 12952; sire, Haldimand, 8806; dam, Blackie of H. P. 10804.

Highly commended, David McCrae, Guelph, Ranee XII., 12801; sire, Quarriar, 10848; dam, Ranee XI., 10865.

Steer or Heifer, under one year. Four entries.

1. David McCrae, Guelph, Ranee XIII., 13973; sire, C. Borderer, 5945; dam, Ranee X., 10855.
2. David McCrae, Guelph, Violet Villiers II., 13970; sire, Bosworth, 12805; dam, V. Villiers, 12805.
3. A. M. & Robert Shaw, Brantford, Minnie May of H. P., 14210; sire, MacCortney, 9739; dam, Flora McErin, 5735.

Highly commended, A. M. & Robt. Shaw, Brantford, Kitty of H. P., 14210; sire McCortney, 9739; dam, Gem 3rd of Drumlanrig, 9187.

Cow or heifer, three years and over. Four entries.

1. W. J. Rudd, Eden Mills, Maude, 1017; sire, Young Ensign, 925; dam, Rose, 953.
2. A. M. & Robt. Shaw, Brantford, Countess of H. P., 10803; sire, Count Monk, 5728; dam, Countess of Murray, 5929.
3. David McCrae, Guelph, College Bright Eyes, 10959; sire, Galloway King, 9690; dam, Bessie of Drumlanrig, 9689.

Highly commended, David McCrae, Guelph, Lizzie of O. E. F., 7187; sire, Galloway King, 9690; dam, Lizzie VII. of Drumlanrig, 9687.

GRADES OR CROSSES.

Steer, two years and under three. Seven entries.

1. John Campbell, Woodville, Perfection.
2. James Leask, Greenbank, Jumbo.
3. Walter Robson & Son, Ayr, Jony Gilpin (Grade Hereford).

Highly commended, James Leask, Greenbank, Jack.

Commended, Matt. Wilson, Fergus, Florall; sire, Sailor Ghief, 18957.

Steer, one year and under two. Seven entries.

1. James Leask, Greenbank, Harry.
3. Thos. Russell & Son, Exeter, Jerry.
3. James Leask, Greenbank, Bob.

Highly commended, John Campbell, Woodville, Model.

Commended, Thos. Russell & Son, Exeter.

Steer, under one year. Four entries.

1. James Leask, Greenbank, Clinker.
2. J. Fried & Sons, Roseville, Jack; sire, Lord Abbott, 20707.
3. J. Fried & Sons, Roseville, Wild Tom; sire, Lord William, 24315.

Highly commended, J. Fried & Sons, Roseville, Look Out.; sire, Lord William, 24315.

Cow or heifer, three years and over. Four entries.

1. James Bowman, Guelph.
2. J. Oke & Sons, Alvinston, Mina.
3. J. Leask, Greenbank, Daudy.

Highly commended, Walter Robson & Son, Ayr.

Heifer, two years and under three. Five entries.

1. James Leask, Greenbank, Lady.
2. J. Fried & Sons, Roseville, Snowflake; sire, Lord Abbott, 20707.
3. Matt Wilson, Fergus.

Highly commended, F. Martindale, York, Miss Lady.

Heifer, under two years. Four entries.

1. James Leask, Greenbank, Susan.
2. John Campbell, Woodville, Beauty.
3) J. Oke & Sons, Alvinston, Rosy.

Highly commended, J. Fried & Sons, Roseville, Carry.

Special.—Prizes in the first six sections of class for Grades or Crosses, won by Grade Hereford, steer by registered Hereford bull (name and number of bull to accompany entry) were increased 25 per cent. by H. D. Smith of Compton, Que.

Special by the Dominion Shorthorn Breeders' Association.

Grade steer, sired by pure bred Shorthorn bull. Five entries.

Prize.—John Campbell, Woodville; sire, Lord Willoughby, 20707.

For Best Animal Shown in the Cattle Department.

Prize.—A "Maple Leaf" Grain Grinder, donated by Goold, Shapley & Muir Company, Brantford, Ontario, Manufacturers of Wind Mills, Grain Grinders, Fanning Mills, etc., the winner having the option of an 8-foot Pumping Mill, "Steel King," or a second option of applying $45 on the purchase of a power Wind Mill outfit.

In case a pure bred Hereford or Hereford Grade won the prize, $25 was offered by the Canadian Hereford Breeders' Association.

In case a Hereford or Hereford Grade, with at least two registered crosses, won the prize, $50 extra was offered fly H. D. Smith of Compton, Que.

Twelve entries.

Prize.—John Campbell, Woodville.

SHEEP.

Cotswolds.

Ewe, one year and under two. Four entrie

1. John Park & Son, Burgessville, Minna Bell, 13649.
2. John Park & Son, Burgessville, Blossom, 14539.
3. Geo. Allen, Imperial Queen, 13753.

Highly commended, John Park & Son, Burgessville, Oriel Lady, 15712.

Ewe, under one year. Five entries.

1. John Park & Son, Burgessville, Park Eve 15, 16027.
2. Geo. Allen, Oriel, Allen's 8, 16409.
3. John Park & Son, Burgessville, May Bird, 16031.

Highly commended, John Park & Son, Burgessville, Rawling's 406, 16069.
Commended, George Allen, Oriel, Allen's 14, 17067.

Wether, one year and under two. Three entries

1. John Park & Son, Burgessville, White Prince, 14534.
2. John Park & Son, Burgessville, Golden King, 14536.
3. John Park & Son, Burgessville, Silver King, 14535.

Wether, under one year. Five entries.

1. Geo. Allen, Oriel, Allen's 16, 17069.
2. John Park & Son, Burgessville, Park 15, 16612.
3. John Park & Son, Burgessville, Park 2, 16591.

Highly commended, John Park & Son, Burgessville, Park 3, 16594.
Commended, Geo. Allen, Oriel, Allen's 15, 17068.

Three wethers, under one year. Three entries.

1. John Park & Son, Burgessville, Park 15, 16612; Park 2, 16591; Park 3, 16594.
2. Geo. Allen, Oriel, Allen's 15, 17068; Allen's 16, 17069; Allen's 17, 17070.
3. John Park & Son, Burgessville, Park 4, 16595; Park 5, 16596; Park 6, 16597.

Three ewes, under one year. Three entries.

1. John Park & Son, Burgessville, Park Ewe 15, 16027; Rawlings 406, 16069; Rawlings 411, 16074.
2. Geo. Allen, Oriel, Allen's 8, 16409; Allen's 14, 17067; Allen's 9, 16410
3. John Park & Son, Burgessville, May Bird, 16031; Park Ewe, 16, 16592; Park Ewe, 14, 16023.

Lincolns.

Ewe, one year and under two. Five entries.

1. William Oliver, Avonbank, Maid of Weidderburn 2nd, 4036.
2. Gibson & Walker, Denfield, G. & W. 411, 4424.
3. Gibson & Walker, Denfield, G. & W., 3205.

Highly commended, Wm. West, Ilderton, Lady C., 3206.
Commended, Wm. Oliver, Avonbank, Maid of Weidderburn, 4035.

Ewe, under one year. Twelve entries.

1. Gibson & Walker, Denfield, G. & W. 458, 4990.
2. Gibson & Walker, Denfield, G & W. 441, 4954.
3. William Oliver, Avonbank, Lady Sampson 3rd, 4577.

Highly commended, William West, Ilderton, West's 18, 5451.
Commended, Gibson & Walker, Denfield, G. & W. 445, 4958.

Wether, one year and under two. Three entries.

1. Gibson & Walker, Denfield, Gem, 3913.
2. Gibson & Walker, Denfield, Dandy, 3909.
3. Gibson & Walker, Denfield, Patchen, 3914.

Wether under one year. Three entries.

1. Gibson & Walker, Denfield, N. A., 5186.
2. Gibson & Walker, Denfield, A. D., 5185.
3. Gibson & Walker, Denfield, West, 5411.

Three wethers, under one year. One entry.

1. Gibson & Walker, Denfield, N. A., 5186; A. D., 5185; West, 5411.

Three ewes, under one year. Four entries.

1. Gibson & Walker, Denfield.
2. Wm. Oliver, Avonbank, Lady Sampson 3rd, 4577; Lady Sampson 1st, 4575; Lady Sampson 2nd 4576.
3. William West, Ilderton, West's 16, 5449; West's 17, 5450; West's 18, 5451.

Highly commended, Gibson & Walker, Denfield.

LEICESTERS.

Ewe, one year and under two. Six entries.

1. J. M. Gardhouse, Highfield, Daisy Gardhouse, 2064.
2. A. W. Smith, Maple Lodge, Missie B., 1823.
3. A. W. Smith, Maple Lodge, Maple Lodge 201, 2104.

Highly commended, A. W. Smith, Maple Lodge, Maple Lodge 206, 2467.
Commended, A. W. Smith, Maple Lodge, Lady Lossie, 2744.

Ewe, under one year. Seven entries.

1. John Kelly, Shakespeare, 2505.
2. John Kelly, Shakespeare, 2502.
3. J. M. Gardhouse, Highfield, Kate W. 2nd, 2488.

Highly commended, J. M. Gardhouse, Highfield, Lucy Temple, 2807
Commended, Orr & Lillico, Galt, Peral, 2572.

Wether, one year and under two. Two entries.

1. Orr & Lillico, Galt, Champion, 2202.
2. Orr & Lillico, Galt, Jack, 2201.

Wether under one year. Three entries.

1. Orr & Lillico, Galt, Champion, 2731.
2. Orr & Lillico, Galt, Bob, 2732.
3. Orr & Lillico, Galt, Jim, 2733.

Three wethers, under one year. Two entries.

1. Orr & Lillico, Galt, Champion, 2731; Bob, 2732; Jim, 2733.
2. Orr & Lillico, Galt, Sandy, 2806; Jack, 2805; Sam, 2807.

Three ewes, under one year. Three entries.

1. John Kelly, Shakespeare, 2502, 2505, 2503.
2. J. M. Gardhouse, Highfield, Kate W. 2nd, 2488; Lucy Temple, 2807; Annie Wells, 2808.
3. Orr & Lillico, Galt.

OXFORDS.

Ewe, one year and under two. Four entries.

1. Smith Evans, Gourock, Evan's 279, 13789.
2. Smith Evans, Gourock, Evan's 272, 13797.
3. J. H. Jull, Mt. Vernon, Cameron 26, 15366.

Highly commended, J. H. Jull, Mt. Vernon, Brant Queen 72, 14688.

Ewe, under one year. Twelve entries.

1. Andrew Elliott, Pond Mills, Pond Mills 33, 16982.
2. Smith Evans, Gourock, Evan's 325, 15990.
3. Smith Evans, Gourock, Evan's 326, 15991.

Highly commended, J. H. Jull, Mt. Vernon, Brant Queen, 84, 16255.
Commended, Andrew Elliott, Pond Mills, Pond Mills 35, 16983.

Wether, one year and under two. Five entries.

1. W. E. Wright, Glanworth, Guelph Boy, 14701.
2. J. H. Jull, Mt. Vernon, Jubilee, 15301.
3. W. H. Beattie, Wilton Grove, Pond Mills 13, 14697.

Highly commended, J. H. Jull, Mt. Vernon, Jubilee King, 15302.
Commended, W. E. Wright, Glanworth, Pond Mills 12, 14696.

Wether, under one year. Three entries.

1. Andrew Elliott, Pond Mills, Pond Mills, 37, 16985.
2. Andrew Elliott, Pond Mills, Pond Mills, 51, 16986.
3. Andrew Elliott, Pond Mills, Pond Mills, 52, 16987.

Three wethers, under one year. One entry.

1. Andrew Elliott, Pond Mills, Pond Mills 37, 16985; Pond Mills 51, 16986; Pond Mills 52, 16987.

Three ewes, under one year. Four entries.

1. Smith Evans, Gourock.
2. Andrew Elliott, Pond Mills, Pond Mills 33, 16982; Pond Mills 35, 16983; Pond Mills 38, 16984.
3. J. H. Jull, Mt. Vernon, Brant Queen 84, 16255; Brant Queen 100, 16210; Brant Queen 105, 16659.

Highly commended, Smith Evans, Gourock.

SHROPSHIRES.

Ewe, one year and under two. Seven entries.

1. John Campbell, Woodville, Campbell's 759, 102159.
2. John Campbell, Woodville, Campbell's 742, 99646.
3. D. G. Hanmer & Sons, Mt. Vernon, J.P.P. 574, 98942.

Highly commended, D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 630, 102468.
Commended, D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 414, 99449.

Ewe, under one year. Nine entries.

1. John Campbell, Woodville, Campbell's 818, 112911.
2. D. G. Hanmer & Sons, Mt. Vernon, Jones' 45, 113459.
3. D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 855, 114016.

Highly commended, John Campbell, Woodville, Campbell's 820, 112912.
Commended, John Campbell, Woodville, Campbell's 868, 114686.

Wether, one year and under two. Eight entries.

1. D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 545, 102407.
2. Richard Gibson, Delaware, Horatio, 99716.
3. Richard Gibson, Delaware, Home Ruler, 99717.

Highly commended, D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 607, 103663.
Commended, W. E. Wright, Glanworth, Wright's 192, 103048.

Wether, under one year. Ten entries.

1. Richard Gibson, Delaware, Ivanhoe, 113067.
2. D. G. Hanmer & Son, Mt. Vernon, Hanmer's 941, 118471.
3. Richard Gibson, Delaware, Invincible 2nd, 120591.

Highly commended, W. H. Beattie, Wilton Grove, Beattie's 700.
Commended, John Campbell, Woodville, Blue Bell, 112222.

Three wethers, under one year. Four entries.

1. Richard Gibson, Delaware, Ivanhoe, 113067; Invincible 2nd, 120591; Idlewilde, 120592.
2. D. G. Han...er & Sons, Mt. Vernon, Hanmer's 941, 118471; Hanmer's 942, 118455, Hanmer's 943, 118456.
3. W. E. Wright, Glanworth, Wright's 271, 118289; Wright's 272, 118290; Wright's 273, 118291.

Three ewes, under one year. Three entries.

1. D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 857, 114018; Jones' 44, 113458; Jones' 45, 113459.
2. John Campbell, Woodville, Campbell's 818, 112911; Campbell's 820, 112912; Campbell's 868, 114686.
3. D. G. Hanmer & Son, Mt. Vernon, Hanmer's 855, 114016; Hanmer's 868, 114029; Hanmer's 853, 114014.

SOUTHDOWNS.

Ewe, one year and under two. Six entries.

1. John Jackson & Sons, Abingdon, Jackson 22B, 10248.
2. W. R. & G. L. Telfer, Paris, Telfer Ewe 65, 10868.
3. W. R. & G. L. Telfer, Paris, Amelia, 10887.

Highly commended, John Jackson & Sons, Abingdon, Jackson 33B, 10425.
Commended, A Simenton & Son, Blackheath, Burgess Ewe 20, 10681.

Ewe, under one year. Ten entries.

1. John Jackson & Sons, Abingdon, Jackson 68B, 11545.
2. T. C. Douglas' Galt, Douglas Ewe 98, 11292.
3. D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 986, 11575.

Highly commended, T. C. Douglas, Galt, Douglas Ewe 99, 11293.
Commended, John Jackson & Sons, Abingdon, Jackson 51B, 11544.

Wether, one year and under two. Eight entries.

1. W. R. & G. L. Telfer, Paris, Jake, 10428.
2. W. E. Wright, Glanworth, 10371.
3. W. R. & G. L. Telfer, Paris, Pat, 10430.

Highly commended, T. C. Douglas, Galt, B-1, 10449.
Commended, T. C. Douglas, Galt, B-2, 10448.

Wether, under one year. Twelve entries.

1. John Jackson & Sons, Abingdon, Tom 20, 11543.
2. John Jackson & Sons, Abingdon, Harry 26, 11542.
3. W. R. & G. L. Telfer, Paris, Billy, 11567.

Highly commended, D. G. Hanmer & Sons, Mt. Vernon, Mutton Maker 8, 11548.
Commended, A. Simenton & Son, Blackheath, Simenton Wether 8, 10984.

Three wethers, under one year. Five entries.

1. John Jackson & Sons, Abingdon, Tom 20, 11543; Harry 26, 11542; Dick 24, 11541.
2. D. G. Hanmer & Sons, Mt. Vernon, Mutton Maker 7, 11547; Mutton Maker 8, 11548; Mutton Maker 9, 11549.
3. A. Simenton & Son, Blackheath, Simenton Wether 8, 10984; Simenton Wether 9, 11557; Simenton Wether 7, 10985.

Highly commended, T. C. Douglas, Galt, C-1, 11584; C-2, 11585; C-3, 11586.

Three ewes, under one year. Three entries.

1. John Jackson & Sons, Abingdon, Jackson 51B, 11544; Jackson 68B, 11545; Jackson 69B, 11546.
2. T. C. Douglas, Galt, Douglas Ewe 98, 11292; Douglas Ewe 99, 11293; Douglas Ewe 100, 11587.
3. A. Simenton & Son, Blackheath, Simenton Ewe 91, 10944; Martin Ewe 86, 11566; Martin Ewe 85, 11565.

Dorset Horns and Merinos.

Ewe, one year and under two. Six entries.

1. R. H. Harding, Thorndale, Harding's 98, 346.
2. Jas. Bowman, Guelph, Bowman's No. 4, 574.
3. R. H. Harding, Thorndale, Harding's 74, 314.

Highly commended, R. H. Harding, Thorndale, Harding's 97, 315.
Commended, W. E. Wright, Glanworth, Dorset Birdie, E. T. 521.

Ewe, under one year. Six entries.

1. R. H. Harding, Thorndale, Harding's 106, 338.
2. R. H. Harding, Thorndale, Harding's 107, 340.
3. R. H. Harding, Thorndale, Perfection 488.

Highly commended, Jas. Bowman, Guelph, Bowman's No. 8, 587.
Commended, W. E. Wright, Glanworth, Dorset Glanworth Lady, E. T. 591.

Wether, one year and under two. Two entries.

1. R. H. Harding, Thorndale, Surprise, 515.
2. R. H. Harding, Thorndale, Baron, 540.

Wether, under one year. One entry.

1. R. H. Harding, Thorndale, Harding's 118, 487.

Hampshires and Suffolks.

Ewe, one year and under two. One entry.

1. John Kelly, Shakespeare, 3898.

Ewe, under one year. Two entries.

1. W. J. Rudd, Eden Mills, Rudd's 25, 80.
2. W. J. Rudd, Eden Mills, Rudd's 26, 81.

Wether, one year and under two. Three entries.

1. W. J. Rudd, Eden Mills, Rudd's 12, 297.
2. W. J. Rudd, Eden Mills, Rudd's 13, 298.
3. W. J. Rudd, Eden Mills, Rudd's 14, 299.

Wether, under one year. Three entries.

1. W. J. Rudd, Eden Mills, Rudd's 19, 374.
2. W. J. Rudd, Eden Mills, Rudd's 28, 383.
3. W. J. Rudd, Eden Mills, Rudd's 27, 382.

Sweepstake for best sheep exhibited at the Show.

Prize.—A plow, donated by the Wilkinson Plow Company, Limited, Toronto, manufacturers of plows, scrapers and wheelbarrows, the winner having the choice of any walking plow made by this company.

Fifteen entries.

1. John Jackson & Sons, Abingdon.

LEICESTER SPECIALS.

The American Leicester Breeders' Association offered special prizes for the best display of Leicester sheep. Not less than five sheep (one ram and four ewes) to constitute the display, and all to be registered in the Flock Book of said Association, and to have the Association's ear tag in ear.

First prize, gold medal. Second prize, Vols. I and II of the American Leicester Record. The award to be made on presentation of properly signed certificate of the Secretary of the Provincial Fat Stock Show to the Secretary of the American Leicester Breeders' Association, Cameron, Ill., U.S.A.

One entry.

1. A. W. Smith, Maple Lodge, Missie B, 1823; Maple Lodge 201, 2104; Maple Lodge 206, 2467; Lady Lossie, 2744; Snell's Sheep 47, 2449.

SHROPSHIRE SPECIALS.

Prizes offered by the American Shropshire Record Association.

Grand sweepstakes premium of the show if won by registered Shropshire sheep. Prize, $50.

Wether, one year and under two. Eight entries.

1. D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 545, 102407.
2. Richard Gibson, Delaware, Horatio, 99716.

Wether, under one year. Ten entries.

1. Richard Gibson, Delaware, Ivanhoe, 113067.
2. D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 941, 118471.

Three wether lambs. Four entries.

1. Richard Gibson, Delaware, Ivanhoe, 113067; Invincible 2nd, 120592; Idlewild le, 120591.
2. D. G. Hanmer & Sons, Mt. Vernon, Hanmer's 941, 118471; Hanmer's 942, 118455; Hanmer's 943, 118456.

Wether, sired by registered Shropshire ram out of grade ewe, one year and under two.

1. D. G. Hanmer & Sons, Mt. Vernon.
2. Richard Gibson, Delaware.

Wether, sired by registered Shropshire ram out of grade ewe, under one year.

1. D. G. Hanmer & Sons, Mt. Vernon.
2. John Campbell, Woodville.

GRADES AND CROSSES.

Ewe, one year and under two. Six entries

1. John Campbell, Woodville.
2. John Campbell, Woodville.
3. W. H. Beattie, Wilton Grove, Allice.

Highly commended, John Park & Son, Burgessville.
Commended, Gibson & Walker, Denfield, Lady H.

Wether, one year and under two. Eight entries.

1. D. G. Hanmer & Sons, Mt. Vernon.
2. Richard Gibson, Delaware, Jonnie.
3. Richard Gibson, Delaware, Tommie.

Highly commended, W. H. Beattie, Wilton Grove, Joe.
Commended, John Campbell, Woodville.

Three wethers, under one year. Four entries.

1. Orr & Lillico, Galt, Jack, Jim and Bob.
2. John Campbell, Woodville.
3. D. G. Hanmer & Sons, Mt. Vernon.

Wether, under one year. Fourteen entries.

1. Orr & Lillico, Galt, Jack.
2. D. G. Hanmer & Sons, Mt. Vernon.
3. John Campbell, Woodville.

Highly commended, John Campbell, Woodville.
Commended, J. H. Jull, Mt. Vernon, Brant Boy 5.

Ewe, under one year. Fourteen entries.

1. D. G. Hanmer & Sons, Mt. Vernon.
2. W. H. Beattie, Wilton Grove, Clara.
3. John Campbell, Woodville.

Highly commended, John Campbell, Woodville.
Commended, W. A. Rennie, Shakespeare.

Ewe or wether, under two years. Four entries.

1. D. G. Hanmer & Sons, Mt. Vernon.

SWINE.

Improved Berkshires.

Barrow, six months and under nine. Four entries.

1. T. A. Cox, Brantford, Fat Stock Hero, 5774.
2. T. A. Cox, Brantford, Fat Stock Boy, 5775.
3. Geo. Green, Fairview, Highclere, 5768.

Highly commended, Geo. Green, Fairview, King, 5769.

Barrow, under six months. Five entries.

1. Geo. Green, Fairview, Wagnar, 5773.
2. Geo. Green, Fairview, Klondike, 5770.
3. T. A. Cox, Brantford, Black Joe, 5774.

Sow, nine months and under fifteen Four entries.

1. Geo. Green, Fairview, Green's Highclere, 6014.
2. Geo. Green, Fairview, Green's Victoria, 6204.
3. Robt. Agnew, Acton, Acton Belle, 6196.

Highly commended, Geo. Green, Fairview, Miss Highclere, 6019.

Sow, six months and under nine. Five entries.

1. Geo. Green, Fairview, Favorite, 6018.
2. T. A. Cox, Brantford, Golden Lass, 6210
3. Geo. Green, Fairview, Lady Shaftsbury, 6207.

Highly commended, Geo. Green, Fairview, Lady Glen, 6206.
Commended, T. A. Cox, Brantford, Southern Lady, 5868.

Sow, under six months. Four entries.

1. Geo. Green, Fairview, Belle of Oxford, 6209.
2. T. A. Cox, Brantford, June Rose, 6211.
3. T. A. Cox, Brantford, June Flower, 6212.

Highly commended, Geo. Green, Fairview, Fancy, 6208.

Three pigs, the offspring of one sow, bred by exhibitor. Three entries.

1. Geo. Green, Fairview.
2. T. A. Cox, Brantford, Brant Queen, 6213; Brantford Lass, 6215; Black Sall, 6214.

Improved Yorkshires.

Barrow, six months and under nine. Seven entries.

1. Henry Dedels, Kossuth, Uncle Tom, 3252.
2. Henry Dedels, Kossuth, Sampson, 3251.
3. Jos. Featherston, Streetsville, British Trade, 3230.

Highly commended, J. E. Brethour, Burford, O. L. Celtic, 3248.
Commended, J. E. Brethour, Burford, O. L. Celtic 2nd, 3249.

Barrow, under six months. Four entries.

1. Jos. Featherston, Streetsville, Canadian Bacon, 3232.
2. Jos. Featherston, Streetsville, Choice Bacon, 3233.
2. Jos. E. Brethour, Burford, O. L. Ruler, 3250.

Sow, nine months and under fifteen. Two entries.

1. Jos. E. Brethour, Burford, O. L. Buttercup 10th, 3235.
2. Jos. Featherston, Streetsville, Twincle, 3203.

Sow, six months and under nine. Five entries.

1. Jos. E. Brethour, Burford, O. L. Cinderella 16th, 3239.
2. Jos. Featherston, Streetsville, Perfection 2nd, 3032.
3. Henry Dedels, Kossuth, Rose Hill, 3242.

Highly commended, Jos. Featherston, Streetsville, Perfection 4th, 3206.

Sow, under six months. Eight entries.

1. Jos. Featherston, Streetsville, Sequel 4th, 3204.
2. Jos. Featherston, Streetsville, Sequel 5th, 3205.
3. Jos. E. Brethour, Burford, O. L. Mite 12th, 3237.

Highly commended, J. E. Brethour, Burford, O. L. Mite 13th, 3238.

Three pigs, the offspring of one sow, bred by exhibitor. Five entries.

1. Jos. E. Brethour, Burford.
2. Jos. Featherston, Streetsville.

CHESTER WHITES.

Barrow, six months and under nine. Six entries.

1. H. George & Sons, Crampton, Bob, 1194.
2. H. George & Sons, Crampton, Bill, 1193.
3. Wm. Butler & Son, Dereham Centre, Ex. Rustler, 1168.
Highly commended, Wm. Butler & Son, Dereham Centre, Ex. Lad, 1169.
Commended, Daniel DeCourcy, Bornholm, Jack, 876.

Barrow, under six months. Seven entries.

1. H. George & Sons, Crampton, Sam, 1192.
2. H. George & Sons, Crampton, Jack, 1191.
3. Wm. Butler & Son, Dereham Centre, Ex. Delight, 1165.
Highly commended, Daniel DeCourcy, Bornholm, Billy, 1183.
Commended, Daniel DeCourcy, Bornholm, Jack, 1184.

Sow, nine months and under fifteen. Five entries.

1. H. George & Sons, Crampton, Snowflake, 1273.
2. Wm. Butler & Son, Dereham Centre, Rosa Anu, 1241.
3. Daniel DeCourcy, Bornholm, Lass, 1176.
Highly Commended, William Butler & Son, Dereham Centre, Ex. Daisy 2, 1251.
Commended, Wm. Butler & Son, Dereham Centre, Exc. Perfection, 1249.

Sow, six months and under nine. Seven entries.

1. Daniel DeCourcy, Bornholm, Lola, 1178.
2. H. George & Sons, Crampton, George's Choice, 1277.
3. H. George & Sons, Crampton, Maggie, 1274.
Highly commended, Wm. Butler & Son, Dereham Centre, Exc. Pert, 1250.
Commended, Wm. Butler & Son, Dereham Centre. Exc. Sely, 1247.

Sow, under six months. Five entries.

1. Daniel DeCourcy, Bornholm, Queen Bess, 1270.
2. H. George & Sons, Crampton, Sarah, 1276.
3. H. George & Sons, Crampton, Beauty, 1275.
Highly commended, Wm. Butler & Son, Dereham Centre, Exc. Gem, 1246.
Commended, Wm. Butler & Son, Dereham Centre, Exc. Lass 12, 1245.

Three pigs, the offspring of one sow bred by exhibitor. Four entries.

1. H. George & Sons, Crampton.
2. Daniel DeCourcy, Bornholm, Billy, 1183; Jack, 1184; Queen Bess, 1270.
3. Wm. Butler & Son, Dereham Centre.

POLAND CHINAS.

Barrow, six months and under nine. Four entries.

1. W. & H. Jones, Mt. Elgin, Oxford King, 1207.
2. W. M. & J. C. Smith, Fairfield Plains, Bob Martin, 1203.
3. W. M. & J. C. Smith, Fairfield Plains, Smith's Boy, 1173.

Barrow, under six months. Four entries.

1. W. & H. Jones, Mt. Elgin, Black Jack, 1210.
2. W. & H. Jones, Mt. Elgin, Black Tom, 1209.
3. W. M. & J. C. Smith, Fairfield Plains, MacDonald, 1205.
Highly commended, W. M. & J. C. Smith, Fairfield Plains, Jesse, 1206.

Sow, nine months and under fifteen. Four entries.

1. W. & H. Jones, Mt. Elgin, Lady Klondike, 1315.
2. W. & H. Jones, Mt. Elgin, Black Flo 2nd, 1354.
3. W. M. & J. C. Smith, Fairfield Plains, Bella, 1306.
Highly commended, W. & H. Jones, Mt. Elgin, Lady Millis, 1360.

Sow, six months and under nine. Five entries.

1. W. & H. Jones, Mt. Elgin, March Maid, 1350.
2. W. & H. Jones, Mt. Elgin, Brant's Choice, 1348.
3. W. M. & J. C. Smith, Fairfield Plains, Smith's Rosena, 1319.
Highly commended, W. M. & J. C. Smith, Fairfield Plains, Smith's Adelina, 1318.

Sow, under six months. Six entries.

1. W. & H. Jones, Mt. Elgin, Black Lucy, 1351.
2. W. & H. Jones, Mt. Elgin, Black Maid, 1352.
3. W. & H. Jones, Mt. Elgin, Black Face, 1353.
Highly commended, W. M. & J. C. Smith, Fairfield Plains, Missie, 1344.
Commended, W. M. & J. C. Smith, Fairfield Plains, Lassie, 1345.

Three pigs, the offspring of one sow bred by exhibitor. Three entries.

1. W. & H. Jones, Mt. Elgin.
2. W. & H. Jones, Mt. Elgin.

SUFFOLKS AND ESSEX.

Barrow, six months and under nine. Three entries.

1. T. A. McClure, Meadowvale, Coontown Dude, 23 (Essex).
2. Jos. Featherston, Streetsville, Coontown Dandy, 22 (Essex).
3. Jos. Featherston, Streetsville, Suffolk Barrow, 251.

Barrow, under six months. Three entries.

1. Jos. Featherston, Streetsville, Topsey's Best, 27.
2. T. A. McClure, Meadowvale, Colored Barrow, 25.
3. Jos. Featherston, Streetsville, Essex Bacon, 26.

Sow, nine months and under fifteen. Three entries.

1. Jos. Featherston, Streetsville, Bell Queen, 266.
2. Jos Featherston, Streetsville, Model Maid, 25.
3 T. A. McClure, Meadowvale, Model Beauty, 30 (Essex).

Sow, six months and under nine. Three entries.

1. Jos. Featherston, Streetsville, Coontown Daisy, 27.
2. Jos. Featherston, Streetsville, White Rose, 262.
3. T. A. McClure, Meadowvale, Coontown Topsey, 28 (Essex).

Sow, under six months. Three entries.

1. Jos. Featherston, Streetsville, Dark Cloud, 33.
2. T. A. McClure, Meadowvale, Colored Topsey, 32 (Essex).
3. Jos. Featherston, Streetsville, Black Cloud, 31.

Three pigs, the offspring of one sow bred by exhibitor. Two entries

1. Jos. Featherston, Streetsville.
2. Jos. Featherston, Streetsville.

TAMWORTHS.

Barrow, six months and under nine. Three entries.

1. A. Elliott & Son, Galt, Pat, 1088.
2. H. George & Sons, Crampton, Harry, 1099.
3. Wm. Butler & Son, Dereham Centre, Exc. Dandy, 1079.

Barrow, under six months. Six entries.

1. H. George & Sons, Crampton, Frank, 1101.
2. Wm. Butler & Son, Dereham Centre, Exc. Success, 1094.
3. Wm. Butler & Son, Dereham Centre, Exc. Albert, 1093.

Highly commended. Norman M. Blain, St. George, Freak, 1080.

Sow, nine months and under fifteen. Three entries.

1. Norman M. Blain, St. George, Blain's Sunshine, 1020.
2. Wm. Butler & Son, Dereham Centre, Mary, 1178.
3. Norman M. Blain, St. George, Beauty I Am, 1190.

Sow, six months and under nine. Eight entries.

1. Norman M. Blain, St. George, Katie G., 1183.
2. Wm. Butler & Son, Dereham Centre, Exc. Lady, 1179.
3. Wm. Butler & Son, Dereham Centre, Exc. Red Bird, 1180.

Sow, under six months. Twelve entries.

1. W. R. McDonald, Ridgetown, Ada, 1225.
2. W. R. McDonald, Ridgetown, Sally, 1227.
3. W. R. McDonald, Ridgetown, Susie, 1226.

Highly commended, A. Elliott & Son, Galt, Concord Jane, 1206.

Three pigs, the offspring of one sow bred by exhibitor. Three entries.

1. Wm. Butler & Son, Dereham Centre.
2. A. Elliott & Son, Galt.

DUROC JERSEYS.

Barrow, six months and under nine. Five entries.

1. Tape Bros., Ridgetown, Dryden, 322.
2. Tape Bros., Ridgetown, Fisher, 323.
3. F. W. Terhune, Brantford, Jock, 328.

Highly commended, F. W. Terhune, Brantford, Jake 327.

Barrow under six months. Seven entries.

1. Tape Bros., Ridgetown, Hardy, 324.
2. E. & N. Park. Oriel, Bold Boy, 316.
3. Tape Bros., Ridgetown, Harty. 325.
Highly commended, Tape Bros., Ridgetown, Harcourt, 326.

Sow, nine months and under fifteen. Six entries.

1. Tape Bros., Ridgetown, Dawson's Duchess, 354.
2. F. W. Terhune, Brantford, Golden Rosey. 362.
3. W. M. & J. C. Smith, Fairfield Plains. Louise, 315.
Highly commended, Tape Bros., Ridgetown. Jean, 355.
Commended, Tape Bros., Ridgetown, Matilda, 356.

Sow, six months and under nine. Eight entries.

1. Tape Bros., Ridgetown, Fisher Maiden, 357.
2. W. M. & J. C. Smith, Fairfield Plains, Mina, 317.
3. W. M. & J. C. Smith, Fairfield Plains. Bertha, 318.
Highly commended, Wm. Butler & Son, Dereham Centre, Exc. Maud, 349.
Commended, Wm. Butler & Son, Dereham Centre, Exc. Lonely Nell, 347.

Sow, under six months. Nine entries.

1. Tape Bros., Ridgetown, Evangeline, 358.
2. E. & N. Park, Oriel, Duroc Queen, 351.
3. F. W. Terhune, Brantford, Judy 367.
Highly commended, Tape Bros., Ridgetown, Genevieve. 359.
Commended, Tape Bros., Ridgetown, Theresa, 360.

Three pigs, the offspring of one sow bred by exhibitor. Five entries.

1. Tape Bros., Ridgetown.
2. Tape Bros., Ridgetown.

GRADES AND CROSSES.

Barrow, six months and under nine. Six entries.

1. T. A. Cox, Brantford.
2. Jos. Featherston, Streetsville, Typical Singer (Essex grade).
3. A. Elliott & Son, Galt.
Highly commended, Wm. Butler & Son, Durham Centre, Jack.

Barrow, under six months. Nine entries.

1. Norman M. Blain, St. George, Flash.
2. Norman M. Blain, St. George, Spotted Chief.
3. Wm. Butler & Son, Dereham Centre, Jim.
Highly commended, W. & H. Jones, Mt. Elgin.
Commended, A. Elliott & Son, Galt.

Sow, six months and under nine. Five entries.

1. A. Elliott & Son, Galt.
2. Wm. Butler & Son, Dereham Centre, Susay.
3. Jos. Featherston, Streetsville, York Singer.

Sow, under six months. Nine entries.

1. Norman M. Blain, St. George, Blossom.
2. Wm. Butler & Son, Dereham Centre, Hanna.
3. W. & H. Jones, Mt. Elgin.
Highly commended, A. Elliott & Son, Galt.
Commended, A. Elliott & Son, Galt.

Large hog, heaviest sow or barrow, any age. Four entries.

PRIZE.—A gang plow, value $16, was donated by the Massey-Harris Co., Limited, Toronto, manufacturers of farm implements.

1. Robt. Agnew, Acton.

EXPORT BACON HOGS.

Four Improved Berkshires. Three entries.

1. Geo. Green, Fairview.
2. T. A. Cox, Brantford.
3. Geo. Green, Fairview.

Four Improved Yorkshires. Five entries.

1. Jos. Featherston, Streetsville.
2. Jos. E. Brethour, Burford.
3. Henry Dedels, Kossuth.
Highly commended, Jos. E. Brethour, Burford.
Commended, Jos. Featherston, Streetsville.

Four Tamworths. Five entries.

1. H. George & Son, Crampton.
2. W. R. McDonald, Ridgetown.
3. A. Elliott & Son, Galt.

Highly commended, Wm. Butler & Son, Dereham Centre.
Commended, Wm. Butler & Son, Dereham Centre.

Four Chester Whites. Six entries.

1. Daniel DeCourcy, Bornholm.
2. Wm. Butler & Son, Dereham Centre.
3. R. H. Harding, Thorndale.

Four Poland Chinas. Four entries.

1. W. & H. Jones, Mt. Elgin.
2. W. M. & J. C. Smith, Fairfield Plains.

Four Duroc Jerseys. Five entries.

1. F. W. Terhune, Brantford.
2. Tape Bros., Ridgetown.

Four Suffolks and Essex. Three entries.

1. T. A. McClure, Meadowvale.
2. Jos. Featherston, Streetsville (Suffolks).

Four grades or crosses. Fifteen entries.

1. J. H. Wilson, Mt. Vernon.
2. Wm. Butler & Son, Dereham Centre.
3. A. Elliott & Son, Galt.

Highly commended, E. & N. Park, Oriel.

Two best export bacon hogs, dressed, to be brought to the show alive and killed the second day of the exhibition. Nineteen entries.

1. H. George & Sons, Crampton.
2. J. R. McWilliams, Mt. Vernon.
3. J. R. McWilliams, Mt. Vernon.

Highly commended, Geo. Green, Fairview.
Commended, Jos. Featherston, Streetsville.

Four export bacon hogs, any breed or grade. Twenty-eight entries.

1. Jos. E. Brethour, Burford.
2. Jos. Featherston, Streetsville.
3. J. H. Wilson, Mt. Vernon.
4. H. George & Sons, Crampton.

Highly commended, Wm. Butler & Son, Dereham Centre.

Fifty dollars of the money offered for four export bacon hogs, any breed or grade, was the Prince of Wales' Prize; the balance, $75, was donated by the Wm Davies Company, Toronto, F. W. Fearman Hamilton, and the Ingersoll Packing Company, Ingersoll—each firm giving $25.

Sweepstake for best animal in the swine department. Eleven entries.

Prize. A "Leader" Corn and Root Cultivator, value $10, donated by Thom's Implement Works, Watford, manufacturers of high-class farming implements, the winner having the option of a corn sheller.

1. George Green, Fairview.

Specials.

The following special prizes were offered by the Canadian Holstein-Friesian Association. For best pure bred dairy cow, $25; for the two next best Holstein-Friesian dairy cows, registered in the C. H. F. H. B., $15 and $10 respectively.

The Holstein-Friesian Association of America offered as specials $25 for the first and $15 for the second, to be paid to any Holstein-Friesian cows winning premiums in competition with cattle of other breeds, providing such animals are recorded in the herd book of the Association.

Most valuable exhibit.

For the most valuable exhibit in the dairy department. The value of each animal to be computed from the result of the dairy test. Prize, a No. 2 grinder, complete, value $50, donated by Matthew Moody & Sons, Terrebonne, Que., manufacturers of threshing machines, hay presses, combined grinders, binders, reapers, mowers, rakes, etc.

RESULTS OF THE DAIRY TEST, 1898.

Order of merit.	Name.	Owner.	Address.	Lbs. solids not fat.	Lbs. fat.	Points for solids not fat.	Points for fat.	Points for conformation.	Points for days in milk.	Total points.
			Shorthorn cow over thirty-six months.							
1st	Jubilee's Julian, 23,523	H. K. Fairbairn	Thedford	7.751	3.039	31.004	60.78	10	0	101 784
2nd	Bella Gwynne, 19,656	John Kelly	Shakespeare	4.966	2.170	19.864	43.40	7	.....	70.264
			Shorthorn cow, under thirty-six months.							
1st	Matilda 9th, Vol. XV	Thos. Russell & Son	Exeter	3.501	1.612	14.004	32 24	7	0	53.244
2nd	Gracie Gwynne, Vol. XV	John Kelly	Shakespeare	3.454	1 480	13.816	29.60	7	... ..	50.416
			Ayrshire cow, over thirty-six months.							
1st	Nellie Gray, 2,057	N. Dyment	Clappison	5.543	2.572	22.172	51.44	8	15.7	97.312
2nd	Briery Banks Cora, 2,846	N. Dyment	Clappison	6.290	2 574	25.160	51.48	9	6 3	91.940
3rd	Dolly Duchess, 2,746	W. M. & J. C. Smith	Fairfield Plains	5.301	1.951	21.204	39 02	7	2.6	69.824
4th	Dunoon, 7,035	J. R Alexander	Brantford	4.474	1.750	17.896	35.00	7	9.7	69.596
			Ayrshire cow, under thirty-six months.							
1st	Fanny of Fairfield, 3,307	W. M. & J. C. Smith	Fairfield Plains	5 667	2 096	22.668	41 92	8	1	73.588
2nd	Primrose 9th, 3,012	J. McCormack & Sons	Rockton	5.383	1.867	21.532	37.34	5	7 7	71 572
3rd	Pearl of Hickory Hill, 3,365	N. Dyment	Clappison	4 676	1.747	18.704	34 94	7	7.1	67.744
4th	Gurta 21st, 3,308	W. M. & J. C. Smith	Fairfield Plains	2.933	1.058	11.732	21.16	7	3.8	43.692
			Holstein cow, over thirty-six months.							
1st	Calamity Jane, 1,156	A. & G. Rice	Curries' Crossing	13.675	4.941	54.7	98 82	10	0	163.52
2nd	Lady Pietertje's Konigen, 659	A. & G. Rice	Curries' Crossing	9.981	3.733	39 924	74.66	7	1	122.584
3rd	Winnie R., 2,158	A. & G. Rice	Curries' Crossing	9.059	2 934	36.236	58.68	8	6.6	109.516
			Holstein cow, under thirty-six months.							
1st	Daisy Texal 2nd, 1,637	A. & G. Rice	Curries' Crossing	11.567	4 295	46.268	85.9	9	0	141 168
2nd	Dewdrop Clothilde, 1,641	A. & G. Rice	Curries' Crossing	6.270	2 463	25.08	49.26	7	0.6	81 94
3rd	Daisy Texal, 3rd, 1,845	A. & G. Rice	Curries' Crossing	6.426	2.460	25.704	49.2	6	0.1	81.004

Jersey cow, over thirty-six months.

1st	Daisy of Clandeboya, 79,769	W. J. Elliott	New Durham	4.574	2.628	18.296	52.56	8	19.5	98.356
2nd	Rhoda, 86,918	B. H. Bull & Son	Brampton	5.723	2 931	22.892	58.62	9	4.4	94.912
3rd	Colonia, 89,822	B. H. Bull & Son	Brampton	5.498	2.680	21.992	53.6	7	1	83 592
4th	Ruby Cecile, 98,683	W. J. Elliott	New Durham	3.930	2.441	15.720	48.82	7	4 5	76.01

Jersey cow, under thirty six months.

1st	Bettina of Brampton, 132,219	B. H. Bull & Son	Brampton	5.425	2.155	21.7	43 1	9	8.5	82.3
2nd	Minett of Brampton, 127,555	B. H. Bull & Son	Brampton	4.052	2.085	16.208	41.7	7	5.7	70.608
3rd	Kathleen of Brampton, 132,220	B. H. Bull & Son	Brampton	4.401	2.093	17.604	41.86	8	2.8	70.264
4th	Maid of Burford, 117,179	W. J. Elliott	New Durham	3 082	1 694	12 328	33.88	6	17.8	70.008

Guernsey cow, over thirty-six months.

1st	Tamarina, 6.176	Wm. Butler & Son	Dereham Centre	2.933	1 778	11.732	35 56	9	14.6	70.892
2nd	Lady Suke, 6,926	Wm. Butler & Son	Dereham Centre	2.004	1.176	8.016	23.52	9	23	63.536

Guernsey cow, under thirty-six months

1st	Daisy Rose of Sunny Springs, 9,076	Wm. Butler & Son	Dereham Centre	2.426	1.385	9.704	27.72	7	24.5	68.924

Grade cow, over thirty six months.

1st	Lady Cleveland	F. Martindale	York	9.376	3 353	37.504	67.06	7	0	111.564
2nd	Utopia	H. McDougall	Guelph	8 547	3.261	34.188	65.22	8	0	107.408
3rd	Flora	J. R. Alexander	Brantford	7.495	2 862	29.984	57 24	8		95.224
4th	Rockton Lass	W. T. Thompson	Rockton	5.426	2.238	21.704	44.76	7	16	89.461

Grade cow, under thirty-six months.

1st		B. H. Bull & Son	Brampton	7.857	3.899	31.428	77 98	8	4	124.408
2nd	Daisy	W. T. Thompson	Rockton	3.249	1.744	12.996	34.88	8	27	82 876
3rd	Daisy Rose	Wm. Butler & Son	Dereham Centre	3.340	1.816	13 360	36.32	8	21.1	78 78

Best pure bred Dairy cow, etc.

1st	Calamity Jane	A. & G. Rice	Curries' Crossing							
2nd	Daisy Texal 2nd	A. & G. Rice	Curries' Crossing							
3rd	Lady Pietertje's Konigen	A. & G. Rice	Curries' Crossing							

Most valuable exhibit.

1st		A. & G. Rice	Curries' Crossing							

APPENDIX II.

OFFICERS AND COMMITTEES OF THE PROVINCIAL FAT STOCK AND DAIRY SHOW FOR 1899.

Officers.

President, John I. Hobson, Guelph; Vice-President, J. C. Snell, London; Secretary Treasurer, A. P. Westervelt, Toronto.

Committees.

Executive and Programme: President, Vice-President, Secretary, and Messrs. J. E. Brethour, Burford; Jas. Tolton, Walkerton; H. Wade, Toronto; G. W. Clemons, St. George; A. M. Smart, Col. Gartshore and Col. Leys, London.

Committee on Cattle: John I. Hobson, G. W. Clemons, Richard Gibson, Delaware; Henry Hardy, Strathroy; Charles Trebilcock, The Grove.

Committee on Sheep: Jas. Tolton, Walkerton; John Jackson, Abingdon; R. H. Harding, Thorndale; A. W. Smith, Maple Lodge; R. W. Jackson, Arva; Allan Bogue, London.

Committee on Swine: G. B. Hood, Guelph; J. E. Brethour, Geo. Green, Fairview; John Laidlaw, Wilton Grove; Hardy Shore, Glanworth.

Dairy Committee: Prof. G. E. Day, Guelph; H. Wade, G. W. Clemons, R. G. Murphy, Elgin; D. Drummond, Myrtle; R. M. Piper, Lambeth; Ald. E. Parnell, London; John S. Pearce, London.

Poultry Committee: J. E. Meyer, Kossuth; Robt. H. Essex, Toronto; John S. Pearce, Allan Bogue, W. McNeil, London.

Reception Committee. Col. Gartshore, Mayor Wilson, John I. Hobson, J. C. Snell, J. Mattison, J. W. Little, Arthur Johnston, W. J. Reid, H. Wade, Col. Leys, Ald. R. A. Carruthers, F. W. Hodson.

Superintendent of Building: D. G. Hanmer, Burford.

Assistant Superintendent: J. H. Saunders, London.

Official Reporter: G. deW. Greene, Toronto.

THE PROVINCIAL FAT STOCK AND DAIRY SHOW.

A meeting of the directors of the Provincial Winter Show convened in the Palmer House, Toronto, Friday, February 10th, 1899, at 10 a.m. The delegates from the various Live Stock Associations were as follows: Cattle Breeders' Association—John I. Hobson, Guelph; G. W. Clemons, St. George; Richard Gibson, Delaware. Sheep Breeders' Association—R. H. Harding, Thorndale; A. W Smith, Maple Lodge; Jas Tolton, Walkerton; D. G. Hanmer, Burford. Swine Breeders' Association—Geo Green, Fairview; J. E. Brethour, Burford; G. B. Hood, Guelph. Butter and Cheese Association of Eastern Ontario—H. Wade, Toronto.

The officers, directors and committees for 1899 were then elected.

Judges in the Cattle Department.—Thos. Crawford, M.P.P., Toronto; James Smith, Brantford. Reserve, T. O. Robson, St. Mary's Referee, J. T. Gibson, Denfield.

Judge in charge of the Dairy Test.—G. E. Day, Guelph.

Judges in the Sheep Department.—Judges nominated by the Sheep Breeders' Association were confirmed, and in each case a reserve judge was added. Prof. J. H. Grisdale, Ottawa, was appointed a reserve judge for Leicesters, Lincolns, and Cotswolds, and also for Grades; Henry Arkell, Teeswater, reserve judge for Shropshires, Southdowns, Horned Dorsets, and Merinos, also for Oxfords, Hampshires and Suffolks

The judges recommended by the Swine Breeders' Association were confirmed.

Moved by Jas. Tolton, seconded by J. E. Brethour, that $40 for advertising be divided between the Farmer's Advocate, Farming and the Weekly Sun. (Carried)

It was decided on motion that the place for holding the Show should not be decided at this meeting, but that application should be received by the Secretary. The President and Secretary should be a committee to visit places making application, with a view to ascertain facilities of such places. If thought wise by the President and Secretary, the board of directors shall be called together for the purpose of selecting a place If the President and Secretary do not consider it necessary, the board will not be called together, but shall receive full particulars from the Secretary by letter,

The rules and regulations, and prize list as amended by the various Associations, were accepted. It was also decided that it will not be necessary hereafter to record wethers, they being subject to the same conditions as barrows. These conditions are set forth in the report of the Swine Breeders' meeting.

The rules and regulations and the prize list for the poultry department were left in the hands of the poultry committee. The passenger rates were left in the hands of the Executive.

The financial statement of the Secretary-Treasurer was presented and accepted, after which the meeting adjourned.

DIRECTORS' MEETING.

A meeting of the officers and directors of the Provincial Fat Stock and Dairy Show was held at the Tecumseh House, London, on Saturday, April 22nd, 1899, at 1 30 p.m The members present were: John I. Hobson, G. W. Clemons, Geo. Green, J. E Brethour, R. H. Harding, A. W. Smith, James Tolton, H. Wade, and F. W. Hodson. Proxy votes were received from R. Gibson and G. B. Hood.

The question considered at the meeting was the location of the next Provincial Fat Stock and Dairy Show. After full discussion a vote was taken and resulted in 59⅓ votes being cast for London, and 24 ⅔ for Brantford. The members representing the different Associations were allowed the following votes:—Cattle Breeders' 25; Sheep Breeders' 21, Swine Breeders' 37; Butter and Cheese Association of Eastern Ontario 1. It was

decided the vote should be taken individually, each man casting one-third of the votes allowed the Association which he represented. After taking the vote it was unanimously resolved that London be the point at which the next Show is held, provided the officials of London sign the necessary agreement. The President, Secretary and a solicitor to be chosen by them, were appointed a committee to deal with the London officials.

On hearing a report from the Secretary, it was resolved that if Mr. Leach cannot act as judge in the bacon classes at the next Show, the Secretary be instructed to obtain, if possible, the services of an expert from the Collingwood Packing House to take his place.

THE ONTARIO PROVINCIAL FAT STOCK AND DAIRY SHOW.

Rules and Regulations.

General Rules.

1. Entries should be made on or before November 25th, by application to the Secretary, who will furnish blank applications on which to specify exhibitor's name and address, with age and description of animals offered. Entries received at the Toronto Post Office after November 25th will be charged double fees. No entries will be accepted which have been received at the Toronto Post Office after December 2nd.

N. B.—The Secretary was given special instructions that the above clause must be strictly complied with.

2. A card will be furnished the exhibitor at the time of making the entry, specifying the class, the number of the section, and the number of the entry, which card must remain attached to the animal during the exhibition ; but in the case of sheep and pigs the card must be attached to the pen.

3. No animal deemed unworthy by the judges shall be awarded a premium, but no prize shall be withheld merely because there is no competition.

4. No animal shall compete for a sweepstake or special prize that has not been shown in a regular class, or is eligible to be shown in such a class.

5. Diligence will be used by the officers of the board to prevent injury to or loss of property, but they will not be responsible for any loss or damage that may occur.

6. Each animal must be shown in the section of the class to which it belongs.

7. All animals must remain in the ring for a few minutes after prizes are awarded, and the public given an opportunity to examine them.

8. All animals must be the bona fide property of the exhibitor, and must be in his possession for at least thirty days previous to the exhibition.

9. The registration certificates of cows and heifers, ewes and sows, must be produced in the show ring. A statement of breeding signed by the breeder must be produced in the case of steers, wethers and barrows. The statement must give the name and number of sire and dam.

10. Exhibitors must give the number of each breed to be exhibited by them ; space will only be provided for this number.

11. No person will be allowed in the building for the purpose of purchasing milk.

12. No dog shall be allowed in the building during the time of holding the show.

13. General rules will apply to each department.

14. The exhibition will open at 8 a. m., December 12th, and close at 3 o'clock p.m., December 15th. The exhibitors will be allowed to remove animals after 3 p. m. Admsission will be charged until midnight of December 15th.

Rules Governing Cattle Department.

15. All cattle shown in the pure-bred classes must be recorded in the Canadian Records, or in reputable English or American Records, or in the case of steers, the dam and sire must be recorded. (See Rule 2.)

16. The following entrance fees will be charged and must accompany each application for entry: For each entry, with the exception of those designated "Special," $2.

In the case of pure-bred animals the name of the breeder and the age and record number of the animal must be given at the time of making the entry if the animal is recorded: in the case of steers, if not recorded, the name must be given at the time of making the entry, also the name and record number of the sire and dam.

In the case of grades, statements naming the number and kind of crosses, and if from a pure bred sire the name and number of the sire must be given at the time of making the entry.

No entry will be accepted unless these conditions are complied with.

17. Cattle brought to the show, but not entered, will not be allowed to compete, but will be charged $2.50 per head.

18. The age of fat cattle will be computed to the 1st of September.

19. Each exhibitor of cattle must be a member of the Dominion Cattle Breeders' Association.

20. A catalogue will be published, and numbers corresponding with those in the catalogue will be furnished exhibitors on their arrival. These numbers must be attached to the animals during the entire time of the exhibition. An exhibitor failing to comply with this rule may, at the discretion of the board, forfeit any prize money won by his animals.

Rules Governing Sheep Department.

21. Each sheep shown is the pure-bred classes must be recorded in the Canadian Records or in reputable English or American Records, and shall be labelled with the Association tag, or in the case of wethers the dam and sire must be recorded.

22. All animals shown in this department shall be American or Canadian bred.

23. The following entrance fees will be charged and must accompany each application for entry, for which accomodation will be provided: For each entry with the exception of those designated "Special," 75 cents.

In the case of pure-bred sheep, the name of the breeder and the age and record number of the animal must be given at the time of making the entry, if the animal is recorded. In the case of wethers, if not recorded the name must be given at the time of making the entry, also the name and record number of the sire and dam.

In the case of grades a statement giving the number and kind of crosses must be given at the time of making the entry.

No entry will be accepted unless these conditions are complied with.

24. Animals brought to the show, but not entered, will not be allowed to compete, but will be charged $1 per head.

25. The age of sheep will be computed to 1st of December.

26. Each exhibitor of sheep must be a member of the Dominion Sheep Breeders' Association.

27. A catalogue will be published, and numbers corresponding with those in the catalogue will be furnished exhibitors on their arrival. These cards must be carried into the ring by the person in charge of each exhibit, and must afterwards be attached to the pen containing the animal. An exhibitor failing to comply with this rule may, at the discretion of the board, forfeit any prize money won by his animals.

Rules Governing Swine Department.

28. All sows shown in the pure-bred classes must be registered in the Canadian Records.

29. All animals shown in this department shall be American or Canadian bred.

30. The following entrance fees will be charged and must accompany each application for entry: For each entry, with the exception of those designated "Special," 75 cents.

In the case of pure-bred animals, the name of the breeder and the age and record number of the animal must be given at the time of making the entry, if the animal is recorded; in the case of barrows, if not recorded, the name must be given at the time of making the entry, also the name and record number of the sire and dam.

In the case of grades the number and kinds of crosses must be given at the time of making the entry.

No entry will be accepted unless these conditions are complied with.

31. Animals brought to the Show, but not entered, will not be allowed to compete, but will be charged for space $1.00 per head.

32. The age of the swine will be computed to the 1st of December.

33. Each exhibitor of swine must be a member of the Dominion Swine Breeders' Association.

34. A catalogue will be published, and numbers corresponding with those in the catalogue will be furnished exhibitors on their arrival. These cards must be carried into the ring by the person in charge of each exhibit and must afterwards be attached to the pen containing the animal. An exhibitor failing to comply with this rule may at the discretion of the Board forfeit any prize money won by his animals.

Rules Governing the Dairy Department.

35. All cows shown in the pure-bred classes must be recorded in Canadian Records or in reputable English or American Records.

36. The following entrance fees will be charged and must accompany each application for entry: For each entry, with the exception of those designated "Special," $2.00.

In the case of pure-bred animals, the name of the breeder and the age and record number of the animal must be given at the time of making the entry.

In the case of grades, a statement giving the number and kind of crosses, and if from a pure-bred sire the name and number of the sire must be given at the time of making the entry.

No entry will be accepted unless these conditions are complied with.

37. Each exhibitor of cattle must be a member of the Dominion Cattle Breeders' Association.

38. The age of dairy cattle will be computed to the 1st of August.

39. Cows must all be giving milk, and all the awards in the dairying department shall be made by the following scale:

20 points for each pound of fat.
4 points for each pound of solids (not fat).
1 point for each ten days in milk after the first 30 days (limit 10 points).

40. The milking competition shall extend over 48 hours, and will take place on Tuesday and Wednesday, December 12th and 13th. Rations fed competing cows will not be considered. Exhibitors may have the privilege of milking their cows twice or three times during each day. When the cows are to be milked only twice each day,

they shall be milked dry in the presence of the judges at 6 o'clock on the evening of December 11th, and the test will conclude at 6 p.m. on December 13th. When cows are to be milked three times during each day, they shall be milked dry in the presence of the judges at 9 o'clock on the evening of December 11th, and the test will conclude at 9 p.m. on December 13th. The percentage of fat in the milk will be determined by the Babcock Milk Tester, and the percentage of solids (not fat) will be determined by ascertaining the specific gravity of the milk and then estimating the amount of solids (not fat by the use of the authorized formula for that purpose.

41. An affidavit will be required from each exhibitor in the Dairy Department stating the number of days his exhibits have been in milk, also stating that each exhibit is shown in her proper class, and that she is the animal named on the registration certificate produced.

42. Exhibitors will be held responsible for the safe keeping of their cows during the test.

43. All stock must be in the stalls not later than 2 p.m., Monday, December 11th. (See clause 2 under animals.)

44. A catalogue will be published, and numbers corresponding with those in the catalogue will be furnished on their arrival. These numbers must be attached to the animals during the entire time of the exhibition.

45. In the sections for cows 36 months and over, a cow must make a total score of not less than 70 points, according to the scale, in order to be eligible for a *first prize*; and a total score of not less than 50 points, according to the scale, in order to be eligible for a *second* or *third prize.*

In the sections for heifers under 36 months, a heifer must make a total score of not less than 55 points, according to the scale, in order to be eligible for a *first prize*; and a total score of not less than 45 points, according to the scale, in order to be eligible for a *second* or *third prize.*

46. Prizes in the Dairy Department may not be paid for one week after the Show is held. This rule is made necessary on account of the large amount of work in figuring out the result of the test.

47. All milk must be handed in at the dairy room in a clean and marketable condition and will be taken charge of by the Association and the product sold and divided pro rata among exhibitors in the dairy department. Illustrated addresses on butter making will be given.

Rules Governing Dressed Poultry Department.

48. All poultry shown must have been bred and fed by exhibitor, and shall be labelled with the name of the variety of the breed to which it belongs. Cross breds shall be labelled with the names of the varieties of the breeds used in the cross mating.

Eggs shall be labelled with the name of the variety of the breed by which they were laid, and shall have been laid by fowls owned by the exhibitor.

A declaration from any exhibitor confirming his or her statements may be required by the poultry committee.

49. The following entrance fees will be charged and must accompany each application for entry: For each entry 25 cents. An entry fee will be charged for each special and sweepstake.

50. All exhibits must be received not later than 1 p.m., December 12th.

51. No exhibit shall be removed until the close of the exhibition.

52. The poultry committee reserves the right to reject any entry.

53. Exhibits must be sent to the show room addressed to superintendent of the show, in whose care they will remain during the exhibition. Owner's name and address must be on each package for the return journey.

54 Poultry must be exhibited undrawn, and feathers shall not be plucked from the head, nor from the upper portion of the neck.

55. Prizes for dressed poultry will be awarded on "best" and "best dressed."

56. In entry form use columns marked "Class," "Section," "Description of animal," and "Amount of Fee."

Animals.

57. No animal shall be removed until the close of the exhibition.

58. All stock, other than that competing in the dairy classes, must be in the stalls or pens on Tuesday, December 12th, at 1 o'clock p.m. Stock competing in the dairy classes must be in the stalls not later than 2 p.m., December 11th, but if the owners desire it, they may be brought Saturday, December 9th. Preparations will be completed Friday, December 8th.

59. Cattle must be well halter-broken. No vicious animals will be admitted.

Awarding Committees.

60. Awarding committees, except in the poultry department, will consist of two judges and a reserve judge for each class or classes.

61. Awarding committees will commence examination on the second day of the show at 10 30 a.m. and continue until awards are completed.

62. No person shall act as judge of any lot in which he may be interested as an exhibitor, the agent or employee of an exhibitor, or otherwise.

63. No animal deemed unworthy by the judges shall be awarded a premium; but no premium shall be withheld merely because there is no competition.

64. All animals, except those exhibiting in the dairy classes, shall be judged from a consumer's standpoint. The awards shall be given to the animal most valuable from a consumer's point of view.

65. In case of protest, notice must be given to the secretary before or during the examination of the animal or article protested, or within four hours after the close of said examination a written statement setting forth the reason for protesting must be filed with the secretary on the day the notice is given, and a deposit of $5, except in the poultry department, left with the protest, and forfeited if the protest is not sustained. Protest fees in the poultry department will be $2.

66. In all cases where protests are entered for improper or malignant purposes, the board shall exclude the party protesting from exhibition for two years thereafter.

67. Any exhibitor who shall tear off a premium ribbon or card, or authorize another to do so in the presence of the judge, or shall otherwise insult the judges, shall forfeit the premium and be excluded from competition.

68. Judges are instructed that if they have good reason to believe that an exhibitor, by false entry or otherwise, attempts to deceive the committee or the public, and obtain an award for misrepresentation, they shall report the fact at once in writing to the secretary, who shall report the same to the directors, who may expel such exhibitor for fraud for at least two years, and may withhold any or all prizes awarded to said exhibitor.

69. The registration certificates of cows and heifers, ewes and sows must be produced in the show ring. A statement of breeding signed by the breeder must be produced in the case of steers, wethers and barrows. The statement must give the name and number of sire and dam.

70. The entry books must be returned by the judges of each department to the secretary as soon as the awards in each are completed.

71. Great care must be exercised to preserve the judges' books, and the awards must be entered as above, in a plain, legible manner, in the proper place, as the premiums will be paid on the authority of these entries *only*.

72. Judges will be particular to observe the following: Red ribbons are destined for first premiums; blue ribbons for second premiums; white ribbons for third premiums; green ribbons for fourth, or highly commended; yellow ribbons for fifth or commended.

73. Decision of judges shall be final, and no appeal will be considered except in cases of fraud or protest.

74. Objections to a person serving as judge must be submitted to the secretary in writing not later than November 1st, 1899, and give good and sufficient reasons therefor.

75. Any exhibitor attempting to interfere with judges during their adjudications, will be promptly excluded from competition.

Superintendent.

76. The superintendent shall be subject to the executive committee. He shall have charge of the building, caretaker, etc. He will designate the hours of feed, forage and bedding for animals on exhibition, which can be obtained on application to him at reasonable rates. Stalls and pens shall be cleaned before 8 a.m. and kept clean until 10 p.m. each day of the show. The aisles and passages shall be kept clean and unencumbered. Feed or bedding shall not be placed in the aisles or litttered about the building, but all parts thereof shall be kept scrupulously clean and tidy.

Admission Fees.

77. Tickets admitting gentlemen, 25 cents; ladies free; boys under twelve years 10 cents.

Special to Exhibitors Coming a Distance of Over One Hundred Miles.

76. Any exhibitor requiring to bring his stock over one hundred miles from any point in Ontario, will be entitled to a rebate equal to the freight charges on his shipment for the distance it was carried over one hundred miles. In order to avail himself of this privilege, an exhibitor must write the secretary at least three weeks before the show is held, giving full particulars as to the point of shipment, the distance from the show, and the carrying line. The exhibitor must also at the time of the show furnish a receipt showing the amount paid, the point of shipment and the number and kind of animals included in the car. No rebate will be allowed unless the above conditions are complied with.

PRIZE LIST.

Ten per cent. may be added to the prizes won by any exhibitor in any class if he furnishes the Secretary within fourteen days after the close of the exhibition, with a detailed statement setting forth how his animal or animals were bred, and how and what fed, and how cared for from the time of birth to the date of the show. If possible, the cost of the feed consumed should be given, if not exactly, approximately. An exhibitor of cattle who furnishes acceptable data concerning his cattle, shall have the prises won by him in the cattle department increased by ten per cent., but if he wins prizes in the sheep department he must furnish similar data concerning his sheep before the prizes won by him in the sheep department shall be similarly increased. An exhibitor of swine or of poultry will be dealt with in like manner. The exhibitor furnishing the most valuable information in the cattle department shall receive an additional prize of five dollars. A similar prize of five dollars will be given in each of the other departments, viz., sheep, swine and poultry. If a statement furnished by an exhibitor is considered unworthy of publication by the judges on account of it not being practically valuable to the public, the writer shall not be allowed the additional ten per cent., nor be allowed to compete for the five dollars offered for the best statement in each department.

N.B.—Ten per cent. will be added to the prizes offered by the Dominion, Cattle, Sheep and Swine Breeders' Association only.

No entry will be required to be made for the above.

CATTLE.

Class 1.—Shorthorns).

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. Steer, 2 years and under 3	$40	$30	$20	H.C.	C.
2. Steer, 1 year and under 2	40	30	20	H.C.	C.
3. Steer, under 1 year	30	20	10	H.C.	C.
4. Cow or heifer, 3 years and over	15	10	5	H.C.	C.
5 Heifer, 2 years and under 3	10	8	5	H.C.	C.
6. Heifer, under 2 years	10	8	5	H.C.	C.

One-half prizes in Sections 1, 2 and 3 of Class 1 are donated by the Dominion Shorthorn Breeders' Association.

Class 2.—Specials by Shorthorn Breeders' Association.

Sect.
1. Sweepstake for best Shorthorn steer, $25.
2. Sweepstake for best Shorthorn cow or heifer, $20.

Class 3.—Sweepstake.

Sect.
1. For best animal exhibited in Class 1, Cement, donated by Estate of John Battle, Thorold, Ont., value $25.
2. For two best animals in Class 1, one ton Albert's Thomas-Phosphate Powder, donated by T. C. Wallace, 58 Canada Life Building, Toronto, value $25.

Class 4.—Herefords and Polled Angus.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. Steer or heifer, 2 years and under 3	$20	$15	$10	H.C.	C.
2. Steer or heifer, 1 year and under 2	20	15	10	H.C.	C.
3. Steer or heifer, under 1 year	15	10	5	H.C.	C.
4 Cow or heifer, 3 years and over	15	10	5	H.C.	C.

Special.

First premiums in Class 4 won by Aberdeen-Angus will be increased 75 per cent. by the American Aberdeen-Angus Breeders' Association if recorded in the Herd Book of the above association.

Class 5.—Sweepstake.

Sect.
1. For best animal exhibited in Class 4, a Scuffler, donated by Thom's Implement Works, Watford, Ont., value $10.
2. For two best animals exhibited in Class 4, one ton Albert's Thomas-Phosphate Powder, donated by T. C. Wallace, 58 Canada Life Building, Toronto, value $25.

Class 6.—Galloways and Devons.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. Steer or heifer, 2 years and under	$20	$15	$10	H.C.	C.
2. Steer or heifer, 1 year and under 2	20	15	10	H.C.	C.
3. Steer or heifer, under 1 year	15	10	5	H.C.	C.
4. Cow or heifer, 3 years and over	15	10	5	H.C.	C.

Class 7.—Sweepstake.

Sect.
1. For best animal exhibited in Class 6, Cement, donated by Isaac Usher & Son, Queenston, Ont., value $25.
2. For two best animals in Class 6, one ton Albert's Thomas-Phosphate Powder, donated by T. C. Wallace, 58 Canada Life Building, Toronto, value $25.

Class 8.—Grades and Crosses of any Breed.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. Steer, 2 years and under 3	$25	$20	$10	H.C.	C.
2. Steer, 1 year and under 2	20	15	10	H.C.	C.
3. Steer, under 1 year	15	10	5	H.C.	C.
4. Cow or heifer, 3 years and over	20	15	10	H.C.	C.
5. Heifer, 2 years and under 3	20	15	10	H.C.	C.
6. Heifer, under 2 years	20	10	10	H.C.	C.

Special.

Prizes in Class 8 won by Grade Herefords, sired by registered Hereford bull (name and number of bull to accompany entry) will be increased 25 per cent. by H. D. Smith, of Compton, Que.

Class 9.—Sweepstake.

For two best animals exhibited in Class 8, one ton Albert's Thomas-Phosphate Powder, donated by T. C. Wallace, 58 Canada Life Building, Toronto, value $25.

Class 10.—Special.

Best Grade steer, sired by pure bred Shorthorn bull (name and number of bull to accompany entry), $25, donated by the Dominion Shorthorn Breeders' Association.

Class 11.—Championship Prize.

For the best animal shown in the cattle department, a No. 50 Ensilage Cutter, open machine, with roller and ball bearings and La Marsh patent concave knives, value $45, donated by B. Bell & Son, St. George, Ont. An option of the following will be given upon payment of the difference in price: a four-horse Pitts Sweep Power, a No. 60 Ensilage Cutter, or a two or three-horse Tread Power.

If Class 11 is won by a pure bred Hereford or Hereford Grade, $25 additional will be donated by the Canadian Hereford Breeders' Association.

If Class 11 is won by a Hereford or Grade Hereford with at least two registered crosses, $50 extra will be donated by H. D. Smith of Compton, Que.

SHEEP.

Class 12.—Cotswolds.

ect.	1st.	2nd.	3rd.	4th.	5th.
1. Ewe, under 1 year	$10	$8	$5	H.C.	C.
2. Wether, 1 year and under 2	12	9	5	H.C.	C.
3. Wether, under 1 year	10	8	5	H.C.	C.
4. Three wethers, under 1 year	12	9	5	H.C.	C.
5. Three ewes, under 1 year	10	8	5	H.C.	C.
6. Dressed carcass	10	8	4	H.C.	C.

N.B.—The Association will offer to buy the carcasses after the close of the exhibition at the highest market price.

Also see Class 21.

Class 13.—Lincolns.

Sections and prizes same as in Class 12. Also see Class 22.

Class 14.—Leicesters.

Sections and prizes same as in Class 12. Also see Class 23.

Class 15.—Oxfords.

Sections and prizes same as in Class 12. Also see Class 24.

Class 16.—Shropshires.

Section and prizes same as in Class 12. Also see Classes 20 and 25.

Class 17.—Southdowns.

Sections and prizes same as in Class 12. Also see Class 26.

Class 18.—Dorset Horns and Merinos.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. Ewe, under 1 year	$10	$8	$4	H.C.	C.
2. Wether, 1 year and under 2	10	8	4	H.C.	C.
3. Wether under 1 year	10	8	4	H.C.	C.
4. Dressed carcass	10	8	4	H.C.	C

Also see Class 27.

Class 19.—Hampshires and Suffolks.

Sections and prizes same as in Class 18. Also see Class 28.

Class 20.—Shropshire Specials.

Prizes offered by the American Shropshire Record Association.

Sect.
1. Grand sweepstake premium of the show, if won by registered Shropshire sheep, $50.
2. Best registered Shropshire wether, one year old, and under two, 1st premium, $10; 2nd, $5.
3. Best registered Shropshire wether, under one year old, 1st premium, $10; 2nd, $5.
4. Best three registered Shropshire wether lambs, 1st premium, 10; 2nd, $5.
5. Extra special premium for best wether sired by registered Shropshire ram out of Grade ewe, one year old and under two, 1st premium, $10; 2nd, $5.
6. Under one year old, 1st premium, $10; 2nd, $5.

These prizes are offered subject to the following conditions: Sheep competing must be American bred, and owned at least ten days by exhibitor before showing.

Sheep and lambs competing for these prizes must be recorded in the American Shropshire Registry Association Record and bear the ear tag of breeder in one ear and the Association tag with registered number in the other.

Any sheep or lamb having won an Association prize at a State or Provincial fair shall be ineligible to compete for the Association prize at any other State or Provincial fair.

All prizes shall be paid by the Secretary of the American Shropshire Association to exhibitors ONLY upon presentation of certificates from the Secretaries of fairs, giving names and association numbers of sheep that have won.

Judges are requested to make an entry in their books of the number of every winning sheep and lamb.

Class 21.—Sweepstake (Cotswolds).

For best animal in Class 12, a "Maple Leaf" Grain Grinder, donated by Goold, Shapley & Muir, Brantford, Ont. The winner will have the option of applying $45 on the purchase of a power Wind Mill.

Class 22.—Sweepstake (Lincolns).

For best animal in Class 13, a Grain Grinder, donated by J. Fleury's Sons, Aurora, Ont., Value $40.

Class 23.—Sweepstake (Leicesters).

For best animal in Class 14, a combined Corn and Field Cultivator donated by the Massey-Harris Company, Toronto, value $40.

Class 24.—Sweepstake (Oxfords).

For best animal in Class 15, a Plow, donated by Wilkinson Plow Company, Toronto. The winner to choose any Walking Plow made by this Company.

Class 25.—Sweepstake (Shropshires).

For best animal in Class 16, a Spade Harrow, donated by the Wortman & Ward Mfg. Co., London, value $25.

Class 26.—Sweepstake (Southdowns).

For best animal in Class 17, a Feed Cooker, donated by the McClary Mfg. Co., London, value $40.

Class 27.—Sweepstake (Dorset Horns and Merinos).

For best animal in Class 18, 10 barrels Salt (5 barrels cheese salt and 5 barrels butter salt), donated by the Windsor Salt Company, Windsor, Ont.

Class 28.—Sweepstake (Hampshires and Suffolks).

For best animal in Class 19, 10 gallons Cresote Paint, donated by the Sherwin-Williams Company, 21 St. Antoine St., Montreal, Que.

Class 29.—Grades and Crosses.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. Ewe, 1 year and under 2	$12	$8	$4	H.C.	C.
2. Wether, 1 year and under 2	12	8	4	H.C.	C.
3. 3 Wethers, under 1 year	12	8	4	H.C.	C.
4. Wether, under 1 year	8	6	4	H.C.	C.
5. Ewe, under 1 year	8	6	4	H.C.	C.
6. Best Ewe or Wether, under 2 years	10	H.C.	C.		

Class 30.—Grand Sweepstake.

For best sheep exhibited in sheep department, a silver medal, donated by the Canadian Bank of Commerce, Guelph, Ont.

Class 31.—Prince of Wales' Prize.

Pen of 5 pure bred lambs, ewes or wethers, under 1 year old, owned by exhibitor and bred in Canada; each entry to be all of one breed and to be judged from a consumer's standpoint. Prizes,—1st, $30; 2nd, $20.

SWINE.

Class 32.—Improved Berkshires.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. Barrow, 6 months and under 9	$10	$6	$4	H.C.	C.
2. Barrow, under 6 months	10	6	4	H.C.	C.
3. Sow, 9 months and under 15	12	8	4	H.C.	C.
4. Sow, 6 months and under 9	10	6	4	H.C.	C.
5. Sow, under 6 months	10	6	4	H.C.	C.
6. 3 pigs, the offspring of 1 sow bred by exhibitor	15	10	H.C.	C.	

Also see Class 39.

Class 33.—Improved Yorkshires.

Sections and prizes same as in Class 32. Also see Class 40.

Class 34.—Chester Whites.

Sections and prizes same as in Class 32. See also Class 41.

Class 35.—Poland Chinas.

Sections and prizes same as in Class 32. See also Class 42.

Class 36.—Suffolks and Essex.

Sections and prizes same as in Class 32. See also Class 43.

Class 37.—Tamworths.

Sections and prizes same as in Class 32. See also Class 44.

Class 38.—Duroc Jerseys.

Sections and prizes same as in Class 32. See also Class 45.

Class 39.—Sweepstake (Berkshires).

For best animal in Class 32, a Disc Harrow, donated by Frost & Wood Company, Limited, Smith's Falls, Ont The Harrow is one of Frost & Wood's "Windsor" Discs, No. 4, with twelve 18-inch plates, and three horse attachment, value $26.

Class 40.—Sweepstake (Yorkshires).

For best animal in Class 33, a Feed Cooker, donated by The Ripley Hardware Co., Grafton, Ill., value $54.

Class 41.—Sweepstake (Chester Whites).

For best animal in Class 34, a Spramotor, donated by the Spramotor Company, London, Ont.

Class 42.—Sweepstake (Poland Chinas).

For best animal in Class 35, Cement, donated by the Estate of John Battle, Thorold, Ont., value $25.

Class 43.—Sweepstake (Suffolks and Essex).

For best animal in Class 36, Cement, donated by Isaac Usher & Son, Queenston, Ont., value $25.

Class 44.—Sweepstake (Tamworths.)

For best animal in Class 37, a No. 15 Disc Harrow, donated by The Noxon Company, Limited, Ingersoll, value $25.

Class 45.—Sweepstake (Duroc Jerseys).

For best animal in Class 38, 1 ton Albert's Thomas-Phosphate Powder, donated by T. C. Wallace, 58 Canada Lite Building, Toronto, value $25.

Class 46.—Grades and Crosses.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. Barrow, 6 months and under 9	$12	$8	$4	H.C.	C.
2. Barrow, under 6 months	10	6	4	H.C.	C.
3. Sow, 6 months and under 9	12	8	4	H.C.	C.
4. Sow, under 6 months	10	6	4	H.C.	C.

Class 47.—Export Bacon Hogs.

$50 of the amount offered for Export Bacon Hogs is donated by the Ingersoll Packing Company, Ingersoll, Ont., Cheese Exporters and Pork Packers.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. 2 Improved Berkshires	$15	$10	$5	H.C.	C.
2. 2 Improved Yorkshires	15	10	5	H.C.	C.
3. 2 Tamworths	15	10	5	H.C.	C.
4. 2 Chester Whites	15	10	5	H.C.	C.
5. 2 Poland Chinas	15	10	5	H.C.	C.
6. 2 Duroc Jerseys	15	10	5	H.C.	C.
7. 2 Suffolks and Essex	15	10	5	H.C.	C.
8. 2 Grades or Crosses	15	10	5	H C.	C.

Class 48.—Sweepstake.

	1st.	2nd.	3rd.
2 Best Export Bacon Hogs, any breed	$15	$10	$5

N.B.—Hogs competing in any other class are eligible to compete in Classes 47 and 48.

Class 49.

Export Bacon Hogs, dressed, to be brought to the Show alive and killed the first or second day of the Exhibition.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. 2 Improved Berkshires	$20	$15	$10	H.C.	C.
2. 2 Improved Yorkshires	20	15	10	H.C.	C.
3. 2 Tamworths	20	15	10	H.C.	C.
4. 2 Chester Whites	20	15	10	H.C.	C.
5. 2 Poland Chinas	20	15	10	H.C.	C.
6. 2 Duroc Jerseys	20	15	10	H.C.	C.
7. 2 Suffolks and Essex	29	15	10	H.C.	C.
8. Grades or Crosses	20	15	10	H.C.	C.

Sweepstake.

	1st.	2nd.	3rd.	4th.	5th.
2 Best Carcasses, any breed	$25	$15	$10	H.C.	C.

N.B.—The Association will offer to buy the carcasses after the close of the Exhibition at the highest market price.

RULES.

1. No animal deemed unsuitable for export bacon purposes by the Judges shall be awarded a premium, but no premium shall be withheld merely because there is no competition.

2. Hogs shown in any other Class are eligible to compete in Classes 47 and 48.

3. Other rules governing the swine department will apply to the Bacon Class.

N.B.—Hogs which meet the pork packers' requirements weigh between 160 and 200 pounds. They are long in the body, deep in the side, narrow in the shoulder, with small heads and hams in proportion to the body, and not too fat; the ideal weight is between 170 and 180 pounds.

DAIRY.

$50 has been donated towards the Prize List in the Dairy Department by the Cheese and Butter Association of Eastern Ontario.

Class 50.—Shorthorns.

Sect.	1st.	2nd.	3rd.	4th.	5th
1. Cow, 36 months and over	$60	$40	$30	$15	C.
2. Cow, under 36 months	60	40	30	15	C.

$200 of the above is donated by the Dominion Shorthorn Breeders' Association.

Class 51.—Ayrshires.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. Cow, 36 months and over	$32.50	$22.50	$15.00	H.C.	C.
2. Cow, under 36 months	32.50	22.50	15.00	H.C.	C.

$50 of the above is donated by the Canadian Ayrshire Breeders' Association.

Class 52.—Holsteins.

Sect.	1st.	2nd.	3rd.	4th.	5th.
1. Cow, 36 month and over	$20	$15	$10	H.C.	C.
2. Cow, under 36 months	20	15	10	H.C.	C.

Class 53.—Jerseys.

Sections and prizes same as in Class 52.

Class 54.—Guernseys.

Sections and prizes same as in Class 52.

Class 55.—Grades.

Sections and prizes same as in Class 52.

Class 56.—Specials.

The following prizes are offered as specials in this Class by the Canadian Holstein Friesian Association:—For best pure bred Dairy Cow, $25; for the next two best Holstein-Friesian Dairy Cows, registered in the C.H.F.H.B., $15 and $10 respectively.

The Holstein-Friesian Association of America offers as specials in this Class, $25 for the first, and $15 for the second, to be paid to any Holstein-Friesian Cows winning premiums in competition with cattle of other breeds providing such animals are recorded in the herd book of the Association.

Class 57.—Sweepstake.

3 best cows or heifers, of one breed or all grades of one breed. Prizes—1st, A Melotte Separator, donated by R. A. Lister Company, Montreal, value $100.

2nd, A Platform Scale, donated by the Gurney Scale Company, Hamilton, value $30.

Class 58.—Sweepstake.

2 best heifers under 36 months, of one breed or both grades of one breed, a Gasoline Engine, donated by the Northey Mfg. Co., Toronto, value $140.

N.B.—No exhibitor will be allowed to win more than one of the prizes offered in Classes 57 and 58.

Extra Special.

John S. Pearce, Esq., of London, offers as a prize a Silver Cup, valued at $50, as a sweepstake prize for the best cow or heifer exhibited at the Ontario Provincial Fat Stock Dairy Show.

To become the final owner, an exhibitor must win the cup twice in succession or on three separate occasions. The cup is in the possession of the Secretary and will be on exhibition at the Secretary's office during the time of the Show.

Special.

If championship cow is a pure bred Shorthorn, $100 additional will be donated by the Dominion Shorthorn Breeders' Association and awarded to the owner as a Special Prize.

DRESSED POULTRY AND EGGS.

(*Read the Rules governing Poultry Exhibit.*)

Class 59.—Fowls.

Sect.		1st.	2nd.	3rd.	4th.
1.	Pair Brahmas of 1899, any variety	$3	$2	$1	H.C.
2.	" Cochins of 1899, any variety	3	2	1	H.C.
3.	" Langshams of 1899	3	2	1	H.C.
4.	" Plymouth Rocks of 1899, any variety	3	2	1	H.C.
5.	" Wyandottes of 1899, any variety	3	2	1	H.C.
6.	" Minorcas or Andalusians of 1899, any variety	3	2	1	H.C.
7.	" Leghorns of 1899, any variety	3	2	1	H.C.
8.	" Dorkings of 1899, any variety	3	2	1	H.C.
9.	" Houdans, La Fleche, Creve Coeurs, or Orpington's of 1899, any variety	3	2	1	H.C.
10.	" Game of 1899, any variety	3	2	1	H.C.
11.	" Cross breeds of 1899, any cross	3	2	1	H.C.

Sweepstake.

12.	Best pair in Class 59	5

Class 60.—Turkeys.

1.	Pair turkeys, any age, males	4	3	1	H.C.
2.	" " females	4	3	1	H.C.
3.	" of 1899, males	4	3	1	H.C.
4.	" " females	4	3	1	H.C.

Sweepstake.

5.	Best pair in Class 60	5

Class 61.—Geese.

1.	Pair geese of 1899, white	4	3	1	H.C.
2.	" " colored	4	3	1	H.C.

Sweepstake.

3.	Best pair in Class 61	5

Class 62.—Ducks.

1.	Pair ducks of 1899, white	4	3	1	H.C.
2.	" " colored	4	3	1	H.C.

Sweepstake.

3.	Best pair in Class 62	5

Class 63.—Collections of Fowls.

1.	Six Brahmas, Cochins or Langshams of 1899	5	2	1	H.C.
2.	Six Plymouth Rocks or Wyandottes of 1899	5	2	1	H.C.
3.	Six Minorcas, Andalusians or Leghorns of 1899	5	2	1	H.C.
4.	Six Dorkings, Houdans, La Fleche, Creve Coeurs, or Orpingtons of 1899	5	2	1	H.C.
5.	Six Games of 1899	5	2	1	H.C.
6.	Six cross breds of 1899	5	2	1	H.C.

Class 64.—Collections of Turkeys, Geese and Ducks.

1.	Six turkeys of 1899	5	3	1	H.C.
2.	Six geese of 1899	5	3	1	H.C.
3.	Six ducks of 1899	5	3	1	H.C.

Class 65.—Eggs. (Double yolks barred.)

1.	Two dozen eggs, heaviest and best, white	3	2	1	H.C.
2.	" " brown	3	2	1	H.C.

Class 66.—Grand Specials.

1.	For best collection of dressed poultry. Prize, a one hundred egg incubator and brooder, manufactured and donated by J. E. Meyer, Kossuth, Ont. Value	$20 00
2.	For best collection of dressed poultry exhibited in any one section of classes 1, 2, 3 or 4. Prize, a one hundred egg incubator and brooder, manufactured and donated by John S. Pearce & Co., London, Ont. Value	20 00
3.	For best collection of dressed poultry exhibited in any one section of classes 5 or 6. Prize, a trio of Buff Plymouth Rocks, bred and donated by Robert H. Essex, Toronto, Ont. Value	10 00

PART OF FIRST CAR OF PURE BRED STOCK TO BRITISH COLUMBIA.

The illustration given herewith is from a photograph taken at Port Perry of part of the first carload of stock shipped to British Columbia by the Live Stock Associations. The bulls were purchased by officers of the Associations for Mr. Edward B. Webster, of Keremeos, B.C, for use on the Western ranges. Mr. Webster considers the venture so successful that he will at an early date make another purchase for British Columbia, which will include Shorthorn, Jersey and Ayrshire cattle, and Shropshire and Oxford sheep.

The car was consigned from Myrtle to Okanagan Landing, B.C., via the G. T. R., loading being completed at Port Perry. The rate to Okanagan Landing, including $3 for stop over at Port Perry, was $135—the reduced rate allowed on registered stock. The car left Port Perry on July 20th and arrived at Keremeos on August 5th. Stock was bought from the following gentlemen : John Bright, Myrtle ; Don White, Ashburn ; F. Franklin, Shirley ; Charles Calder, Brooklin ; D. Drummond, Myrtle ; John Adams, Port Perry ; John Leask, Greenbank ; Oliver Williams, Port Perry ; Albert Williams, Port Perry ; James Cook, Myrtle, and Alex. Calder, Epsom. The quality and breeding of the animals contained in this car was very good. Some of the animals were especially valuable, particularly the bull bought from Mr. James Leask, which was a son of the celebrated Moneyfluffle Lad, and his dam an Isabella cow by imported Vansgarth.

The stock arrived in good shape, and Mr. Webster is much pleased with the purchase.

All particulars regarding the purchase of pure bred live stock and shipping at reduced rates under the auspices of the officers of the Dominion Live Stock Associations may be obtained by application to Mr. A. P. Westervelt, Secretary, Parliament Buildings, Toronto.

APPENDIX III.

HISTORY OF THE PRINCE OF WALES PRIZE.

To What Awarded and by Whom Won from 1861 to 1898 Inclusive.

By H. Wade, Toronto.

Extracts from Transactions of the Board of Agriculture for 1860.

At a meeting of the Board of Agriculture held in the city of Toronto on the 27th of December, 1860, at which the following officers attended, viz.: E. W. Thompson, President; Hon. G. Alexander, A. A. Burnham, Hon. H. Ruttan, R. L. Denison, Hon. D. Christie, John Wade, Dr. J. Beattie, and J. E. Pell, the following letter was read from R. T. Pennefather, Esq., Secretary to His Excellency the Governor-General, Sir E. Head, informing the Board that His Royal Highness the Prince of Wales had been pleased to place at the disposal of the Board the sum of two hundred pounds to be applied in the distribution of prizes as shown by the following extract from a letter to Sir Edmund Head from His Grace the Duke of Newcastle: "The sum of two hundred pounds to be placed at the disposal of each of the two agricultural associations of Upper and Lower Canada, to be applied by the directors of those societies for the distribution of prizes in such way as may appear, after due consideration, best calculated to promote the important object for which the associations were formed."

Resolved,—That the Board desire to express their grateful thanks to His Royal Highness the Prince of Wales for his munificent gift of two hundred pounds to the association; that the money be permanently invested, and that the annual income derived therefrom be awarded as a prize at each successive Provincial Exhibition to be called the Prince of Wales' Prize, and to be given for such objects as may from to time be deemed suitable and advantageous by the Board.

Resolved,—That in addition to the vote of thanks passed at the previous meeting of this Board to His Royal Highness the Prince of Wales for his liberal donation and for the great interest he was pleased to manifest in the agricultural prosperity of this Province, he be now elected a life member of the Agricultural Association of Upper Canada, and presented with a life member's medal.

The amount of $800 is entered in the statement of receipts for 1861, consequently that must have been the amount derived from the two hundred pounds at that time. (See page 328, transactions of Board of Agriculture for 1860-63).

Memorandum of the Minister of Agriculture to Council *Re* Prince of Wales Prize Fund.

The undersigned has the honor to report that in the year 1860 His Royal Highness the Prince of Wales placed at the disposal of the Board of Agriculture and Arts for Upper Canada the sum of $800 desiring that it should be applied as prize money to promote the objects for which the Association was formed.

The Board accordingly decided permanently to invest this money and to devote the income derived therefrom to the payment of premium offered "for such objects as might from time to time be deemed suitable and advantageous by the Board."

The records of the Association show that this course has since been pursued, the money having been invested from time to time, and the interest devoted to the payment of what has been known as "The Prince of Wales' Prize."

In May, 1884, the said $800 was loaned by the Association on mortgage on Toronto Island real estate, bearing interest till April 19th, 1895, at 7 per cent. per annum, at which time the rate was reduced to 6 per cent., said interest being regularly paid to the Association till 1896.

On the last day of January, 1896, the Agriculture and Arts Association was by statute dissolved (58 Vic. chap. 11, sec. 46, entitled "An Act to consolidate and amend the Agriculture and Arts Act") and "all the property and effects, real and personal, of what nature and kind soever vested in the said Agriculture and Arts Association or in the Council of the said Association or held in trust by the said Association or by the said Council for the purposes of the same" became, by section 47, "vested in Her Majesty for the public uses of the Province."

Since that time the following interest payments have been made :

1896	$48 00
1897	48 00
	$96 00

On the first day of July, 1898, the mortgagee paid the principal into the hands of the Provincial Treasurer, together with the six months' interest due, amounting in all to $824.

In February, 1898, a disbursement of $48 was made for the Prince of Wales' Prize for the year 1897, thus leaving a balance of $872 unexpended.

In order that the intentions of His Royal Highness may in future be carried out, the undersigned respectfully recommends that the said eight hundred and seventy two ($872) dollars be placed to the credit of the Consolidated Revenue Fund of the Province, and that out of the annual receipts of the Province the sum of fifty dollars be yearly set apart as a perpetual prize to be given for the improvement of live stock at such agricultural exhibitions and for such classes as may from time to time be determined by the Minister of Agriculture.

Copy of an Order-in-Council approved by His Honor the Lieutenant-Governor, the 23rd day of August, A.D. 1898 :

Upon consideration of the report of the Honorable the Minister of Agriculture, dated 19th August, 1898, with reference to the grant of eight hundred dollars ($800) by His Royal Highness the Prince of Wales to the Board of Agriculture and Arts for Upper Canada, for prize money, the Committee of Council advise that the sum of eight hundred and seventy-two dollars ($872) being the unexpended balance of the said grant, be placed to the credit of the Consolidated Revenue Fund of the Province, and that out of the annual receipts of the Province the sum of fifty dollars ($50) be yearly set apart as a pepetual prize to be given for the improvement of live stock, at such agricultural exhibitions and for such classes as may from time to time be determined by the Minister of Agriculture.

Certified.

(Signed), J. Lonsdale Capreol,
Assistant Clerk, Executive Council.

YEARLY AWARDS.

Horses—$60.—1861, London. Best stallion for general purposes. Awarded to W. J. Armstrong, of Union (near London), for a coach horse named Elgin, out of a class of 38 entries.

Bull, any breed—$60.—1862, Toronto. Awarded to George Miller, Markham, for his Shorthorn bull, Prince of Wales (im.) =204=(18630).

Horses—$60.—1863, Kingston. Awarded to Jas. Armstrong, Yarmouth, for carriage stallion, Anglo-Saxon.

Portable Steam Engine—$60.—1864, Hamilton. Awarded to F. G. Beckett & Co., Hamilton.

Bull, any breed—$60.—1865, London. Awarded to Hon. David Christie, Paris, Shorthorn bull, Oxford Lad=907=(24713).

Agricultural Stallion—$60.—1866, Toronto. Awarded to J. J. Fisher, Colborne, County of Huron, Name not given.

Pen of Cotswold Sheep—$60.—1867, Kingston. Awarded to F. W. Stone, Guelph, for one ram and five ewes.

Herd of Pure Bred Cattle—$60.—1868, Hamilton. Awarded to Hon. M. D. Cochrane, Compton, Que., for one bull and five females, Baron Booth of Lancaster (imp.)=1216=; Rosedale (imp.) =2243=; Maid of Atha; Miss Margaret 3rd=7266=; Wharfdale Rose; fifth not named.

Herd of Durham Cattle—$60.—1869, London. Awarded to John Snell, Edmonton, one bull and five females. London Duke =803=; Clara Barton=759=; Rosamond=4525=; Fairy Gem --989—; Morilla; heifer calf not named.

Flock of Leicester Sheep—$60.—1870, Toronto. Awarded to John Snell, Edmonton, 1 ram, 1 shear and over; 1 ram lamb; 3 ewes, 2 shears and over; 3 shearling ewes; and 3 ewe lambs.

Shorthorn Bull and Five of his Calves—$60.—1871, Kingston. Awarded to John Snell & Sons, Edmonton. London Duke =803=; Gladstone —667—; Marquis of Lorne —2089—; Crimson Rosebud; two other heifer calves.

Flock of Cotswold Sheep—$60.—1872, Hamilton. Awarded to John Snell & Sons, Edmonton; 1 ram, 1 ram lamb, 5 ewes and 5 ewe lambs.

Shorthorn Bull and five calves under one year—$60.—1873, London. Awarded to John R. Craig, Edmonton. Bull, Prince Imperial; calves, Emperor, Proud Prince, Prince Imperial's Gem, Fidelity and Ruberta.

Heavy Draught Stallion and Three Mares—$60.—1874, Toronto. Awarded to Beattie & Miller, Whitevale. Stallion, Johnny Cope; mares, Belle of the Ball, Falls of Clyde, and a Suffolk Punch mare.

Herd of Shorthorn Cattle, 1 Bull and 5 Females—$60.—1875, Ottawa. Awarded to J. & R. Hunter, Alma. Bull, Lord Aberdeen =773=, and five females.

Flock of Cotswold Sheep—$60.—1876, Hamilton. Awarded to James Russell, Richmond Hill, for 1 ram, 1 ram lamb, 5 ewes, and 5 ewe lambs.

Pen of Berkshire Swine—$60.—1877, London. Awarded to John Snell's Sons, Edmonton, for 1 boar, 3 sows, and 1 sow with litter of pigs.

1878, Toronto. Could not trace result.

Shorthorn Herd—$60.—1879, Ottawa. Awarded to Bow Park Herd, Brantford. Bull, 4th Duke of Clarence —79— (33597); Kirkleonigton Duchess 26th; Red Daisy of Fairview 8th —4435; Butterfly Duchess 5th —5509—; Waterloo 37th; Roan Duchess 15th.

1880, Hamilton. Not traced.

Flock of Southdown Sheep—$60.—1881, London. Awarded to John Jackson, Abingdon, 1 ram, not over five shears; 3 ewes, two shears not over seven; 3 shearling ewes; 3 ewe lambs.

Best Three Fat Cattle for shipping purposes—$60.—1882, Kingston. Awarded to H. & J. Groff, Elmira. Canadian Champion, King of the West, and Doctor.

Shorthorn Herd—$60.—1883, Guelph. Awarded to J. & W. Watt, Salem, 1 bull and 4 females.

1884, Ottawa. Not traced.

Heavy Draught Stallion, any breed—$50.—1885, London. Awarded to E. W. & G. Charlton, Duncrief, for stallion Glengarry —18—.

Shorthorn Herd, five females—$50.—1886, Guelph. Awarded to Jas. Hunter, Alma. Rose of Sunnyside, Ganby 2nd —6216—, Gertrude —6238—, and two heifer calves.

Pen of Shropshire Sheep—$50.—1887, Ottawa. Awarded to John Dryden, M.P.P., Brooklin. 1 ram, 1 ram lamb, 3 ewes, 2 ewe lambs.

Berkshire Herd—$50.—1888, Kingston. Awarded to Geo. Green, Fairview. 1 boar, 3 sows.

1889, London. Not traced.

Clydesdale Mare—$50.—1890, Toronto. Spring Clydesdale Show. Owner not traced.

Clydesdale Stallion—$50.—1891, Toronto Spring Stallion Show. Awarded to Graham Bros., Claremont, Macheilage (imp.) [1117] (2992).

Clyde Stallion—$50.—1892, Toronto Spring Stallion Show. Awarded to Graham Bros, Claremont, Queen's Own (imp.) [1705] (7176).

Clyde Stallion—$50.—1893, Toronto Provincial Spring Stallion Show. Awarded to D. & O. Sorby, Guelph. Grandeur (imp.) [1724] (6814).

Hackney Stallion—$50.—1894, Toronto Provincial Spring Stallion Show. Awarded to R. & J. Beith, Bowmanville. Hackney stallion, Ottawa —2—.

Shire Stallion—$50.—1895, Toronto Canadian Horse Show. Awarded to Messrs. Stone & Wellington, Welland. Pride of Hatfield (imp.) —256—.

Thoroughbred Stallion—$50.—1896.—Toronto Canadian Horse Show. Awarded to Robt. Davies, Toronto. Mikado.

Dairy Cow under 36 months—$30.—1897, Provincial Fat Stock and Dairy Show. Awarded to G. W. Clemons, St. George. Queen DeKol 2nd, (C.H.H.B.) 1819.

Dairy Cow 36 months or over—$18.—1897, Provincial Fat Stock and Dairy Show. Awarded to A. & G. Rice, Curries. Calamity Jane (C.H.H.B.) 1156.

Two Export Bacon Hogs, Dressed—1st prize $25; 2nd prize $15; 3rd prize $10.—1898, Provincial Fat Stock and Dairy Show. Awarded to, 1st, H. George & Son, Crampton; 2nd and 3rd, J. R. McWilliams, Mount Vernon.

Four Export Bacon Hogs, any Breed or Grade—1st prize $45—2nd prize $35—3rd prize $25—4th prize $20.—1898. Provincial Fat Stock and Dairy Show. The interest accrued on the principal originally donated by His Royal Highness the Prince of Wales being one year in arrears, $50 of the above prize was provided by one year's interest, making a total of $100 offered in 1898 as a prize known as the Prince of Wales' Prize. The prizes were awarded as follows: —1st, Jos. E. Brethour, Burford; 2nd, Jos. Featherston, M.P., Streetsville; 3rd, J. H. Wilson, Mount Vernon; 4th, H. George & Son, Crampton.

ANNUAL REPORT

OF THE

CANADIAN HORSE BREEDERS' ASSOCIATION

1898-99

To the Honorable the Minister of Agriculture:

I have the honor to present to you the Report of the Canadian Horse Breeders' Association for 1898-99.

Your obedient servant,

HENRY WADE, Secretary.

CANADIAN HORSE BREEDERS' ASSOCIATION.

OFFICERS FOR 1899.

President—Andrew Smith, V.S., Toronto, Ont.

First Vice-President—H. N. Crossley, Toronto, Ont.

Second Vice-President—Robert Beith, M.P., Bowmanville.

DIRECTORS:

Hackney Association—Robert Beith, M.P., Bowmanville, Ont., and John Macdonald, Toronto, Ont.

Shire Horse Association—H. N. Crossley, Toronto, and W. E. Wellington, Toronto.

Clydesdale Horse Association—Robert Davies, Toronto, and Robert Graham, Claremont

Draught Horse Association—Alex. Innes, Clinton, Ont., and James Henderson, Belton.

Thoroughbreds—Dr. A. Smith, Toronto, and Wm. Hendry, Jr., Toronto.

Trotting and Pacing Horse Association—Shelton Fuller, Woodstock, Ont., and E. W. Cox, Toronto.

Additional Directors—D. B. Simpson, Bowmanville, Ont, and George Pepper, Toronto.

Delegates to Toronto Industrial Fair—Robert Beith, M.P., Bowmanville, and H. N. Crossley, Toronto.

Delegates to Western Fair—R. McEwen, Byron, and O. Sorby, Guelph, Ont.

Secretary-Treasurer—Henry Wade, Toronto.

CANADIAN HORSE BREEDERS' ASSOCIATION.

ANNUAL MEETING.

The fifth annual meeting of the Canadian Horse Breeders' Association was held at the Albion Hotel, Toronto, at 8 p.m. on February 9th, 1899.

The following members were present: Robert Davies, Toronto, in the chair; Dr. A. Smith, Toronto; D. B. Simpson, Bowmanville; R. Gibson, Delaware; R. McQuaig, Toronto; Robert Graham, Claremont; A. Doherty, Ellesmere; D. McCrae, Guelph; Jas. Tolton, Walkerton; John Holderness, Toronto; H. N. Crossley, Toronto; J. Henderson, Bolton; Geo. Pepper, Toronto; D. Sorby, Guelph; A. Innis, Clinton; John Davidson, Ashburn; W. J. Howard, Dollar; J. C. Snell, London; H. Wade, Sec.-Treas., Toronto.

It was moved by D. B. SIMPSON, seconded by R. GIBSON, that the printed minutes be taken as read. Carried.

The Secretary's report was then read, and it was moved by RICHARD GIBSON seconded by JAS. HENDERSON, that the report be adopted. Carried.

SECRETARY'S REPORT.

The Secretary then read the following report:

In presenting to you this my Fifth Annual report, I do so with the greater pleasure because, as the result of the last Canadian Horse Show, we have a substantial balance to the good in the bank. The Show was a most successful one in every way, and, while there was some falling off in the heavy classes, due somewhat to the late date at which the Show was held, yet the loss was much more than made up by the increased number of splendid harness horses shown.

The past year has been an eventful one as regards sales. This has been due, not to any falling off in the demand for good horses, but solely to the fact that owing to the inattention paid to breeding horses during the past few years, there are practically no young horses in the country fit for sale. This is now being remedied, and in a year or so the supply of suitable stock will be largely increased, as breeders are now striving to meet the growing demand.

That there is a good market in Great Britain for suitable horses is evidenced by the order recently placed in Chicago for 2,000 coach and other kinds of horses. Why cannot our breeders cater to this demand, and thus enrich themselves and their country with the money which now goes to other countries for such classes of horses.

The following representatives have been recommended by the different Horse Breeders' Associations:

Hackney Horse Society (not yet held annual meeting):—ROBERT BEITH, M.P., and JOHN MACDONALD.

Clydesdale Horse Association:—ROBERT DAVIES and ROBERT GRAHAM.

Shire Horse Association:—H. N. CROSSLEY, W. E. WELLINGTON.

Thoroughbred Horse Association:—DR. SMITH and WM. HENDRIE, JR.

Trotting and Pacing Horse Association:—SHELTON FULLER and E. W. COX

Draught Horse Association:—ALEX. INNES and JAS. HENDERSON.

FINANCIAL STATEMENT, CANADIAN HORSE SHOW, 1898.

Receipts.			Expenditure.		
1898.			1898.		
To Horse Breeders' Association		$2,000 00	By prizes		$3,385 00
" City grant		900 00	" Grant to Military		750 00
" Adam Beck, subscription		50 00	" Expenses of running Show		817 25
" Wm. Hendrie, "		25 00			
" Hackney Horse Society		50 00	Total		$4,952 25
" Hunt Club, subscription		551 25			
" Entry fees		1,213 00			
" Electoral Division subscription		25 00			
" Toronto Street Railway Co		100 00			
" Loss divided equally:					
Hunt Club	$19 00				
H. B. Ass'n	19 00	38 00			
Total		$4,952 25			

CANADIAN HORSE BREEDERS' ASS'N, FINANCIAL STATEMENT FOR YEAR ENDING DEC. 31, 1898.

Receipts.				Expenditure.		
1898.				1898.		
Jan. —To Balance on hand			$835 71	Dec. 31—L. A. grant to Horse Show		$2,000 00
Dec. 31— 57 members' fees			57 00	—Printing, stationery, auditor, stenographer		72 12
Interest on deposit			21 83	—Balance on hand		1,619 76
Legislative grant			2,000 00			
Profit on Military Tournament and Horse Show as per statement of Lt.-Col. Mason	$1,592 68			Total		$3,691 88
Less loss as above	38 00					
		1,554 68				
One half to Hunt Club	$777 34					
One half to H. B. Ass'n	777 34					
			777 34			
Total			$3,691 88			

I hereby certify that I have examined the books of the Canadian Horse Breeders' Association, and that the foregoing financial statement is in accordance therewith.

(Sgd.) Chas. F. Complin.
Auditor.

THE HORSE SHOW.

The President, Mr. Robert Davies, stated that the military people did not feel disposed this year to enter into partnership with the Breeders' Association and Country and Hunt Club; but as the Country and Hunt Club people wished to join us, the Breeders' Association could not let this year go by, but should carry on this show which has been the means of greatly stimulating breeders throughout the country to produce the very highest type of horse. He said: We are depending somewhat on the military authorities to grant us the privilege of exhibiting in their magnificent building, and to-night we are under their wings as far as that is concerned, and we must ask their indulgence and their permission to exhibit in the Armouries. At the same time, I think it is somewhat humiliating that the agricultural interests of this country have to depend upon having a building loaned them, as we should have sufficient money granted by the Government to erect a building for holding Live Stock Shows in Toronto, because this is the centre of the agricultural interests of the Province. So I would urge on the farming community that they should go to their members and get their influence to have such a building erected for holding such shows as mentioned in order to promote the stock-raising industry of our country.

I might say that last year the military, the Breeders' Association and the Country and Hunt Club held a very successful combined show, and after the show was over and all expenses paid we had the handsome sum of about $800, that being our share of the profits. Our secretary will now read a proposition as drawn up between the Horse Breeders' Association and the Country and Hunt Club, and I wish you to thoroughly weigh it and think whether it is judicious and prudent for us to go on and amalgamate with the Hunt Club and have a horse show under the proposed conditions. The whole matter now rests entirely with the Breeders, and it is for you to determine what decision you are going to make.

The proposed agreement was read by the secretary.

Richard Gibson asked the question: Supposing the Hunt Club cannot meet with our proposal, can we get the building?

Dr. Smith: Yes.

R. Gibson: Then I for one would be very sorry to have it said that we cannot hold a show on account of them. We have the money to give the prizes and carry it on, and I see no reason why we could not carry it on ourselves.

A. Innes: Unity is strength, and I would be in favor of amalgamating, even supposing the terms are a little hard on us.

H. N. Crossley: I think the members of the Association would be agreeable to leave the agreement to the directors to be dealt with, as it does not do to decide on this matter hastily. The principal objection taken to the agreement was the clause where the $750 was to be raised by the Country and Hunt Club as most of the Breeders did not think it just for probably one of the Hunt Club men to give a subscription of $100 and that be included in the $750, as it would be voted to their special classes.

Geo. Pepper stated that taking the history for the past three years the grants, entry fees, etc., amounted to $6,250, and we had that amount before the doors were opened. The expenses of the show amounted to $7,000, so all the Association would have to assume providing they did not take a single cent at the door would be $750. The lowest receipts from the gates for the last three years were $3,000, and that would then leave a profit of over $2,000.

D. B. Simpson said that Mr. Pepper had presented the rosy side of the question. But supposing any great accident occurred then the Association would be held responsible, and surely the directors who support the Association would be personally liable.

The Secretary said that they carried an insurance against all accidents, etc.

Dr. Smith: Would the Hunt Club and the Breeders be equally liable, half and half?

D. B. Simpson: They would.

After a little further discussion it was thought the matter had better be left in the hands of the directors or a committee, and it was moved by A. Innes, seconded by J. Henderson, "That we hold a horse show this spring in conjunction with the Country and Hunt Club, on the lines indicated in the draft agreement presented to this Association by the President, with power to the directors or any committee appointed by them to make such amendments to said agreement as they may see fit, to be approved by the President before being finally conclusive. And the President is hereby authorised to sign such agreement when finally settled on behalf of the Association." Carried unanimously.

Just before the resolution was voted on Mr. D. McCrae took objection to the large amount of money the Breeders put into the concern to that of the Hunt Club.

To this objection Mr. Crossley stated that last year $1,310 was divided amongst 74 horses in the breeding classes, while only $2,000 was divided amongst 300 in the other classes.

Mr. J. Henderson said he thought it was in the interests of this Association to appoint a committee to wait on the railway authorities in regard to getting reduced rates for pure bred horses when shipping.

This suggestion met the views of all present, and it was resolved, "That the same committee, Messrs. Davies, Beith and H. Wade, as appointed by the Clydesdale Association, be the representatives of this Association in order to induce the Railway Transportation Committee to give reduced rates to all animals registered in the recognized pure bred Stud Books of Canada on presentation of certificate from any of said books."

Moved by A. INNES, seconded by ROBERT BEITH, M.P., and carried, "That the following gentlemen compose the Committee to meet the Country and Hunt Club: Robert Davies, H. N. Crossley, Dr. A. Smith, John Macdonald, W. E. Wellington, Geo. Pepper, Toronto; D. B. Simpson, Bowmanville; Wm. Hendrie, jr., Hamilton; S. B. Fuller, Woodstock; H. Wade, Sec., Toronto. Carried.

CANADIAN HORSE SHOW.

The fifth annual Canadian Horse Show was held in the Armouries, Toronto, on April 13th, 14th and 15th, 1899, and was, like its predecessors, an unqualified success in every respect. In fact, the interest taken in it grows greater and more widespread every year. An evidence of this is manifest in the largely increased number of coupons taken at the doors from those who purchased their railroad tickets at various points in the Province. The dates selected for the show this year were chosen as early as possible in the season in order to accommodate the many breeders who wished to show their stallions before taking them out on their regular routes, and yet were late enough for the weather to have become fine and warm, so that the comfort of the onlookers was not interfered with. That the dates were satisfactory to all was evident, both from the larger entries in the breeding classes and from the excellent attendance during the afternoons and evenings of the three days, and that, too, in spite of other special attractions and entertainments held in the city during the progress of the show.

The formal opening was held at 2 p.m. on Thursday, May the 13th, when the show was graced by the presence of Lord and Lady Minto. The former in opening the show, in which he took a great interest, pointed out some features which exporters of horses to the British market would do well to observe, especially as regards docking, which he advised them not to perform before shipping. Major-General Hutton, the Commander-in-Chief of the Canadian Militia, who acted as judge in several classes, was another keen-eyed observer, and expressed surprise at the large number of excellent animals present. No doubt, in his confidential report to the British War Office, he will be able to give them a much better opinion of Canadian horses than they once had of them, which was based on the unsuccessful attempt of army officers some years ago to purchase cavalry and military horses in this country. There has certainly been a most wonderful improvement during the last five years in the conformation, quality, style and action of Canadian horses, and a large part of this advance is due to the educating influence of the Spring Horse Show. The American judges who acted this year were greatly surprised at the enormous improvement visible in the horses brought before them, as compared with those shown only three years before, when these same gentlemen were also present. The Show is thus quietly doing the work which its promoters intended it should, and, therefore, the Government and other grants given each year is money well spent on a cause which merits the most careful attention of all interested in our country's welfare—that is, the production of such horses as shall be not only a credit to this Dominion, but a most profitable source of revenue to the breeders as well.

The entries this year were fully one hundred more than in 1898, which had hitherto been the banner year, and, what is most gratifying, the increase was spread well over all the classes. Clydesdales were out in good numbers, while shires were largely reinforced by a number of good ones which had been lately imported. There were some splendid horses among the Clydesdales, and the classes devoted to this breed were more of the size of those shown some years ago than they have been for some time. Hackneys were well represented and showed to good advantage. Thoroughbreds and coach horses were also

good. The harness and saddle classes were very full. In fact some of them were so unwieldy that another year they will have to be divided up as there was hardly enough room in the ring to show them off to advantage. When it is borne in mind that with very few exceptions everything shown was of superior quality, and that three or four years ago such fine horses and such fine rings of them could never have been collected together, it is possible to get some idea of what a vast influence the Canadian Horse Show has exercised on horse breeding generally.

In this connection it will be of interest to note the amounts paid out each year in prizes for breeding classes and other classes in which breeders are interested. In 1895 the Government Grant of $2,000 went to pay for prizes, judges' fees and other expenses. In 1896 the prize list for the above-mentioned classes totalled $2,385; in 1897 $2,430, besides gold and silver medals; in 1898 $2,000, with one gold and four silver medals; in 1899 $2,155, in addition to medals.

In view of the vast improvement visible each successive year, these amounts can only be given so long as the Government deals generously with the Horse Breeders' Association in the matter of a grant, and it is to be deprecated that already some of the discontented think that this modest grant of $2,000 should be divided amongst several towns, which would completely destroy the benefits that are being derived from it in the present method, as no city but Toronto can give the same amount of support that it does.

ADDRESS TO THE GOVERNOR GENERAL.

The following address was presented to the Governor-General, Lord Minto:

To His Excellency the Earl of Minto, Governor General of Canada:

The Chairman and Committee of the Canadian Horse Show welcome your Excellency to this the fifth annual exhibition with a deep sense of the obligation which they gladly owe to you for the presence here to-day of yourself and of Her Excellency, the Countess of Minto, and for the distinguished patronage which you have been pleased to extend to this event, the success of which has become thereby assured.

In adopting the name, "Canadian Horse Show," we have endeavored for the past five years to make this a Dominion rather than a Provincial undertaking, and we venture to think that Your Excellency in accepting our invitation to open this exhibition intimates your recognition of the national public importance of this show, as giving an incentive to the reproduction throughout Canada of the best types of horses, in order that Canada may eventually become the chief breeding place for the supply of Great Britain and other countries of the thousands of horses required yearly for military, agricultural and general purposes.

We are pleased to be able to inform Your Excellency that from year to year there has been a distinct advance both in the number and quality of horses exhibited, and that this year the entries are some fifty in excess of any previous year in the history of the show.

We are not unaware that few men surpass Your Excellency in knowledge of and affection for a good horse, and we are therefore not without hope that in asking you to be present on this occasion and to open this show that the exhibition itself may afford you some real pleasure and enjoyment.

We feel that Your Excellency's attendance here is that of a friend and sympathizer, and not a mere prefunctory exercise of that patronage which is never withheld from deserving objects.

We trust that from personal observation you will be able, by suggestion to assist the Committee to further and greater success in the efforts they are making to render this the best horse show in America, and that possibly you may be able to add the weight of your

great authority to our effort to prove that this Dominion under proper conditions can produce horses fit for any purpose and for any market. We further desire to encourage equestrianism as a healthy and beneficial recreation, and as calculated to keep alive the sturdy fibre, the hardiness and the manliness of the Anglo-Saxon race.

We extend to Your Excellency and the Countess of Minto a cordial welcome. We wish you every success in the distinguished position which you now occupy, and we hope during the continuance of your occupation of your high office to deserve and receive on this and on future occasions your kind support and gracious patronage for the Canadian Horse Show.

On behalf of the Committee,

G. W. Beardmore, Chairman.

The reply of His Excellency was of a most hearty character, and was enthusiastically received.

SECRETARY'S REPORT.

I have once again the pleasure of congratulating you on the unqualified success of our fifth annual Canadian Horse Show, which was opened by Lord Minto with great *eclat* on the afternoon of the first day of the show. So far from paling on the interest of all lovers of horse-flesh it seems to grow more popular every year.

This year the show was held (as it has been every year, except in 1898, when the military joined and gave a tournament), under the joint auspices of the Horse Breeders' Association and the Country and Hunt Club. The military were again asked to join us this year, but declined, and therefore, not without considerable misgivings on the part of some who feared that a purely horse show would not draw the crowds, we determined to test the popular feelings on this score. The result has shown that the horse is still king in the affections of a large part of the population, and that such an array of fine horses as were shown at the late horse show is a sufficient attraction in itself to draw large crowds. The only outside attraction was the Ladies' Ride, which was much appreciated, and, inasmuch as horses took part in it, it can be fitly considered as a picturesque part of the show.

In selecting the time for the show this year we carefully consulted the intersts of breeders by making the dates as early as possible, consistent with fine settled weather. April 13th, 14th and 15th were the days chosen, and they seem to have suited both the breeders who exhibited and the public who attended. There was a very much larger entry in all the breeding classes which, as will be remembered, were rather weak last year, owing to the late date on which the show was held. The Clydesdale classes were very nicely filled, and a very gratifying feature was the larger entry of Shires, some of which were lately imported to this country. The Hackney classes were well represented and so were Thoroughbreds and Coach horses.

In the Harness and Saddle classes the entries were abnormally large. In fact, some of them were so unwieldy, that, another year, they will have to be divided. A most gratifying feature as regards them, as showing that the show is doing its duty as an educating power, are the statements made by the American judges, who were present and who had officiated at former shows held at the Armouries, that a most wonderful improvement was visible in the horses shown as compared with those brought out three years ago. The show is thus quietly doing the work which its promoters intended it should, and, therefore, the Government and other grants given each year is money well spent on a cause which merits the utmost attention and care of all interested in our country's welfare, that is, the raising and production of a better class of horses. The money received from the Government is devoted to the Breeding classes, in addition to prizes for saddle Horses and Ponies, in both of which classes breeders are interested.

Lord Minto, whose partiality for horse-flesh is well known, took great interest in the Horse Show, and, in his reply to the address presented to him, gave some very sensible advice to Canadian Breeders, especially as regards horses intended for the British market. Major-General Hutton kindly officiated as Judge in several classes and was very pleased with the horses brought before him. Both he and Lord Minto made purchases at the Show and several horses changed hands during and after the Exhibition.

I was glad to see such an increased attendance of our country cousins and visitors from other towns this year. Everything betokens a much wider-spread interest in the Show than formerly. The coupons received from the Railway Companies are far in excess of what they have ever been at previous Horse Shows.

PRIZE LIST.

The following list gives the names and owners of the prize-winners in the various classes at the Fifth Canadian Horse Show held at the Armouries, Toronto, on April 13th, 14th and 15th, 1899.

THOROUGHBREDS.

Judges :—T. D. Hodgens, M.P.P., London ; Hugo Reid, V.S., Guelph ; J. G. Rutherford, M.P.P., Portage la Prairie, Man.

Stallions, foaled previous to January 1st, 1896.

1st. King Bob, bay, foaled 1883. Exhibited by W. J. Thompson, Orkney, Ont.; sire, King Ban ; dam, Bobadilla.
2nd Terremont, bay, foaled in 1894. Exhibited by A. Frank & Sons, The Grange, Ont. ; sire, Dandie Dinmont ; dam, Jenny Lind.
3rd. Tyrone, dark bay, aged. Exhibited by Thos. Skinner, Mitchell, Ont.; sire, Mortimer ; dam, Gyptis.

Stallions, foaled in 1896.

1st. Adagio, bay, foaled in 1896. Exhibited by Robt. Davies, Toronto ; sire, Admiral ; dam, Andante.

Stallions foaled subsequent to and on January 1st, 1897.

1st. Happy Hermit, bay, foaled in 1897. Exhibited by F. H. Doley, Toronto ; sire, Anchorite ; dam, Felicity.
2nd. Lord Minto, bay, foaled in 1897. Exhibited by Priest & Muir, Toronto ; sire, Kiomet (imp.) ; dam, Nehusta.

Stallions, qualified to improve the breed of Saddle Horses and Hunters.

1st. Wiley Buckles, bay, foaled in 1885. Exhibited by Quinn Bros., Brampton ; sire, London ; dam, Lizzie.
2nd. Othmar, bay, foaled in 1889. Exhibited by Wm. Hendrie, Hamilton ; sire, Onondaga ; dam, Jocose.
3rd. Wyndham, bay, foaled in 1888. Exhibited by S. B. Fuller, Woodstock, Ont.; sire, Warwick ; dam, by Mortimer (imp.).

Filly or Gelding, bred and owned by exhibitor, not thoroughbred, but sired by thoroughbred stallion, foaled on or subsequent to January 1st, 1896.

1st. Wikh, black m., foaled in 1896. Exhibited by T. M. Walton, Innerkip ; sire Wyndham.
2nd. Florence Dennison, b.m., foaled in 1896. Exhibited by Wm. Ward, Utica, Ont.; sire, Dennison (imp.).
3rd. Mayo, b. m., foaled in 1897. Exhibited by D. B. Simpson, Bowmanville, Ont.; sire, Wiley Buckles.

CARRIAGE OR COACH STALLIONS.

Judges :—R. Gibson, Delaware ; Frank Mitchell, Pawtucket, R.I.

Stallions, foaled previous to January 1st, 1896.

1st. Graf Bremer, brown, foaled in 1889. Exhibited by James McCartney, Thamesford, Ont.
2nd. General Watson, bay, foaled in 1894. Exhibited by Jno. Rodgers, Emery, Ont ; sire, Sim Watson dam, Lady Jefferson.
3rd. Young Duke of Cleveland, bay, foaled in 1889. Exhibited by J. Mannell, Toronto ; sire, Duke of Cleveland (imp.) ; dam, by Master King.

Stallions, foaled subsequent to and on January 1st, 1896.

1st. Candidate 2nd, bay, foaled in 1897. Exhibited by Amos Agar, Nashville, Ont.; sire, Candidate ; dam, Nettie.

STANDARD BRED ROADSTER STALLIONS.

JUDGES :—W. H. Ten Eyck, V.S., Hamilton; Dr. G. A. Routledge, Lambeth.

STALLIONS, FOALED PREVIOUS TO JANUARY 1ST, 1896.

1st. Reflector, bay, foaled in 1889. Exhibited by Graham Bros., Claremont: sire, Duplex 18817; dam, Fanny Russell.
2nd Altoneer 17493, bay, foaled in 1890. Exhibited by Edmund Taylor, Toronto; sire, Sphinx 5343; dam, Pilotina Wilkes
3rd. Alcyonium Boy 2837, chestnut, foaled in 1893. Exhibited by Alex. Clark, Brinston's Corners, Ont.; sire, Alcyonium 12547; dam, Ella J., by Judge Salisbury 5872.

STALLIONS, FOALED SUBSEQUENT TO AND ON JANUARY 1ST, 1896.

1st. Haltoneer 29419, bay, foaled in 1896. Exhibited by Jas. A. Childs, Eglinton, Ont.; sire, Altoneer 17493; dam, Hermione.
2nd. Baron Chimes 28993, bay, foaled in 1896. Exhibited by Harry Webb, Toronto; sire, Chimes 5348; dam, Mayetta.

HACKNEYS.

JUDGES :—R. Gibson, Delaware; F. T. Mitchell, Pawtucket, R.I.

STALLIONS, FOALED PREVIOUS TO JANUARY 1ST, 1896, OVER 15 HANDS 2 INCHES.

1st. Lord Roseberry (imp.)—9—(1307), chestnut, foaled in 1885. Bred by Wm. N. Shaw, Levrett, Lowthorpe, Hull, Eng.; imported and exhibited by Graham Bros., Claremont, Ont.; sire, Lord Derby 2nd (417); dam, roan mare, by Denmark (177).
2nd. Rosseau Performer (imp.)—34—chestnut roan, foaled in 1893. Bred by John T. Browne, Doncaster, England; imported and exhibited by H. N. Crossley, Rosseau, Ont.; sire, Enthorpe Performer (2973); dam, Fanny (111).
3rd. Square Shot (imp.)—27—chestnut, foaled in 1889. Bred by James Griggs, Falkenham, Norfolk, Eng.; imported and exhibited by D. & C. Sorby, Guelph, Ont.; sire, Great Shot 2nd (1490); dam, Myrtle (256).

STALLIONS, FOALED PREVIOUS TO JANUARY 1ST, 1896, NOT EXCEEDING 15 HANDS 2 INCHES.

1st. Squire Rickell—74—264, chestnut, foaled in 1895. Bred by E. W. Twaddell & Sharpe, Devon, Pa., imported and exhibited by R. Beith, M.P., Bowmanville, Ont.; sire, Cadet (imp.)—15—107 (1251); dam; Miss Rickell (imp.)—14—237 (1284)
2nd. Hillhurst Sensation—58—bay, foaled April 30th, 1895. Bred by Hon. M. H. Cochrane, Hillhurst, Que.; exhibited by A. Yeager, Simcoe, Ont.; sire, Hayton Shales (imp.)—22—(4806); dam, Miss Baker (imp.)—16—(4371)
3rd. Mooreland (imp.)—28—(4420), bay, foaled in 1890. Imported and exhibited by Thos. Irving, Winchester, Ont.; sire, Lord Swanland (1834); dam, Fan (5286).

STALLIONS, FOALED SUBSEQUENT TO AND ON JANUARY 1ST, 1896.

1st. Woodlands Performer—68—chestnut, foaled June, 1896. Bred by Hon. M. H. Cochrane, Hillhurst, Que.; exhibited by D. & C. Sorby, Guelph, Ont.; sire, Barthorpe Performer (imp.)—52—(5097); dam, Miss Baker (imp.)—16—575—(4371).
2nd. Rosseau Swell—71—roan, foaled in 1897. Bred and exhibited by H. N. Crossley, Rosseau, Ont.; sire Royal Standard (imp.)—55—3918); dam, Althorpe Countess (imp.)—20—(6357).
3rd. Rosseau St. George—75—bay, foaled April 23rd, 1898. Bred and exhibited by H. N. Crossley. Rosseau, Ont.; sire, Rosseau Performer (imp.)—34—(5391); dam, Lady Bird (imp.)—15—(5510).

MARES, FOALED SUBSEQUENT TO AND ON JANUARY 1ST, 1896.

1st. Cordelia—85—chestnut, foaled in 1897. Bred and exhibited by R. Beith, M.P., Bowmanville, Ont.; sire, Baoquo—3—162; dam, Florence (imp.)—3—354 (661).
2nd. Rosseau Jewell—79—brown roan, foaled May 18th, 1897. Bred and exhibited by H. N. Crossley, Rossean, Ont.; sire, Rosseau Performer (imp.)—34—(5391); dam, Surefoot—4—F.S.
3rd. Miss Roberta—78—dark bay, foaled in 1897. Bred and exhibited by H. N. Crossley, Rosseau, Ont.; sire, Rosseau Performer (imp.)—34—(5391); dam, Lady Bird (imp.)—15—(5510).

HIGH STEPPER, MARE OR GELDING, NOT UNDER 15 HANDS; CONFORMATION AND STYLE OF GOING, AS WELL AS HIGH ACTION, TO BE CONSIDERED; TO BE SHOWN BEFORE A SUITABLE CONVEYANCE, AND SIRED BY A REGISTERED HACKNEY STALLION.

1st. Jessica—25—brown, foaled in April, 1894. Bred and exhibited by R. Beith, M.P., Bowmanville, Ont. sire, Jubilee Chief (imp.)—1—(2122); dam, Mona's Queen (imp.)—4—(5887).
2nd. Glenaldyne, b. m, 6 years old. Exhibited by Crow & Murray, Toronto; sire, Lightning—33—(2540);
3rd. Miss Grace, br. m., 5 years old. Exhibited by E. B. Clancy, Toronto; sire, Lightning—33—.

SWEEPSTAKES—BEST HACKNEY STALLION, ANY AGE, GIVEN BY THE HACKNEY HORSE SOCIETY.

1st. Lord Roseberry (imp.)—9—. Exhibitors, Graham Bros., Claremont, Ont.

SWEEPSTAKES—BEST MARE, ANY AGE, SIRED BY A REGISTERED HACKNEY STALLION, TO BE SHOWN ON THE LINE.

1st. Jessica—25—. Exhibitor, R. Beith, M.P., Bowmanville, Ont.

SWEEPSTAKES—BEST HACKNEY MARE OR FILLY, BY AN IMPORTED SIRE AND OUT OF AN IMPORTED DAM, BOTH REGISTERED IN THE ENGLISH HACKNEY STUD BOOK, GIVEN BY HACKNEY HORSE SOCIETY OF GREAT BRITAIN.—SILVER MEDAL.

1st. Jessica—25—. Exhibitor, R. Beith, M.P., Bowmanville, Ont.

SWEEPSTAKES, BEST HACKNEY STALLION OR ENTIRE COLT, BY AN IMPORTED SIRE OUT OF AN IMPORTED DAM, BOTH REGISTERED IN THE ENGLISH HACKNEY STUD BOOK, GIVEN BY HACKNEY HORSE SOCIETY OF GREAT BRITAIN—SILVER MEDAL.

1st. Woodlands Performer —68—. Exhibitors, D. & O. Sorby, Guelph.

SHIRES.

STALLIONS, FOALED PREVIOUS TO JANUARY 1ST, 1896.

JUDGES:—Frank Mitchell, Pawtucket, R.I.; R. Gibson, Delaware, Ont.

1st. Mawdsley (imp.) [279] (16817), chestnut, foaled in 1895 Bred by James Rutter, Mawdsley, Lancashire, Eng. Imported by E. R. Hogate, Toronto; exhibited by Colborne Shire Horse Association, Colborne, Ont.; sire, London (14710); dam, bay mare, by Wolseley (5442).
2nd. Bahaillon Vulcan (imp) [274] (16502) brown, foaled in 1893. Bred by Richard Morgan, Bahaillon, Newtown, Eng. Imported and exhibited by Morris, Stone & Wellington, Welland, Ont.; sire, Vulcan (4145); dam, Venture. by Coming Wonder (3039).
3rd. Bravo 2nd (imp.) [250] (12836), bay, foaled in 1888. Bred by R. N. Sutton, Nelthorpe, Scawby Hall, Lincolnshire, Eng. Imported by H. N. Crossley, Rosseau, Ont.; exhibited by Thomas Skinner, Mitchell, Ont.; sire, Will o' the Wisp (6574); dam, Boadicea.

STALLIONS, FOALED IN 1896.

1st. Rosseau Royal Albert [271] bay, foaled in 1896. Bred by J. T. Brown, Althorpe, Doncaster, England Imported and exhibited by H. N. Crossley, Rosseau, Ont.; sire, Patrician (10143); dam, Althorpe Dew drop (17668).

MARE, ANY AGE.

1st. Brunette [132], dark bay, foaled May 5th, 1893. Bred by Charles Jackson, Mayfield, Ont. Exhibited by Wm. Hendrie, Toronto; sire, Samson the Great (imp.) [263]; dam, Bounce (imp.) [144]
2nd. Lorne Belle [133], brown, foaled May, 1894. Bred by Charles Jackson, Mayfield, Ont. Exhibited by Wm. Hendrie, Toronto; sire, Darnley (imp) [183] (3585); dam, Bounce's Blossom [15].

CLYDESDALES.

STALLIONS, FOALED PREVIOUS TO JANUARY 1ST, 1896.

JUDGES:—E. W. Charlton, Duncrief; George Gray, Newcastle.

1st. Young Duke of Fife (imp.) [2463] (10300), light bay, foaled May 2nd, 1892. Bred by Jos. Hewitson, Balterson, Newton Stuart, Scotland. Imported by Thomas Robbie, Edinburgh, Scotland; exhibited by Graham Bros., Claremont, Ont.; sire, Orlando (8092); dam, Nancy Lee (1875).
2nd. Macarlie [2464] (8782), chestnut, foaled June 20th, 1893. Bred by L. B. Goodrich, State Centre, Iowa. Imported and exhibited by Graham Bros., Claremont, Ont.; sire, MacClarkie (imp) [810] (6996); dam, Grace Darling (imp.) [2534] (4795).
3rd. Gay Prince (imp.) [2470], dark brown, foaled April 25th, 1895. Bred by Wm. Renwick, Meadowfield, Corstorphine, Scotland Imported by Dalgetty Bros., Glencoe, Ont.; exhibited by T. H. Hassard, Millbrook, Ont.; sire, Prince Alexander (8899); dam, a mare by St. Stephen (7231).

STALLIONS, FOALED IN 1896.

1st. Lyon Macgregor (imp.) [2308], brown, foaled April 18th, 1896. Bred by Stephen Hunter, Stranraer, Scotland. Imported and exhibited by Robert Davies, Toronto; sire, Macgregor (1487); dam, Olivette (12797)
2nd. Prince of Kinellar (imp.) [2475], dark bay, foaled June 11th, 1896. Bred by James Durns, Westertown, Aberdeenshire, Scotland. Imported by G. Campbell, Kinaldie, Scotland. Exhibited by John Davidson, Ashburn, Ont., sire, Prince of Erskine (9647) dam, Polly of Westertown (Vol. 21).
3rd. Prince of Biantyre [2239], bay, foaled in 1896. Bred and exhibited by Alex. Doherty, Ellesmere, Ont.; sire, Prince of Quality (imp.) [2173] (5648); dam, Miss Fleming (imp.) [1919]

STALLIONS, FOALED SUBSEQUENT TO AND ON JANUARY 1ST, 1897.

1st. Prince of the Glen [2306], bay, foaled March 21st, 1897. Bred and exhibited by Robert Davies, Toronto; sire, Prince of Quality [2173]; dam, Edith (imp.) [1322].
2nd. Aberdeen [2447], light chestnut, foaled May 17th, 1897. Bred by Wm. Rolph, Markham; exhibited by Graham Bros., Claremont; sire, Macquaker (imp.) [2244] (9798); dam, Comely 2nd [853] (3002).
3rd. Baron's Model, bay, foaled April 21st, 1897. Bred by A. W. Donnan, Whithorn, Wigtownshire, Scotland; exhibited by Robert Davies, Toronto; sire, Baron's Pride (9122); dam, Lily.

CANADIAN-BRED CLYDESDALES.

STALLIONS, FOALED PREVIOUS TO JANUARY 1ST, 1899.

1st. Sir Julian [2466] (8751), brown, foaled May 18th, 1896. Bred and exhibited by David Carstairs, Bomanton, Ont ; sire, Sir Henry Fielding (imp.) [2319] (9412) ; dam, Lady Abbott [2531].
2nd. West York Stamp [2356], bay, foaled April 29th, 1898. Bred and exhibited by Amos Agar, Nashville, Ont.; sire, Westfield Stamp (imp.) [1819] (9467) ; dam, Belle of Nashville [2412].
3rd. Amber Boy [2465], bay, foaled May 28th, 1897. Bred and exhibited by W. J. Howard, Dollar, Ont.; sire, Red Waltie (imp.) [2287] (8133) ; dam, Doll Burns [1510].

CLYDESDALE MARES, IMPORTED OR CANADIAN BRED, ANY AGE.

1st. Rose of Blanchard [2462], bay, foaled May 12th, 1894. Bred by George Duffield, Granton, Ont.; exhibited by George Moore, Waterloo, Ont.; sire, Rakerfield (imp.) [487] (4190) ; dam, Menie (imp.) [2368] (12452).
2nd. Nelly (imp.) (1323), bay, foaled May, 1888. Bred by David Alston, Crosslee, Stow, Scotland ; imported in 1890 by Graham Bros., Claremont, Ont.; exhibited by Robert Davies, Toronto ; sire, Lord Lynedoch (4530) ; dam, Maggie of Hyndford (1).
3rd. Sonsie Lass [2313] (7660), bay, foaled April 8th, 1893. Bred by N. P. Clark, St. Cloud, Minn.; exhibited by D. & O. Sorby, Guelph, Ont.; sire, Second Choice (imp.) [1431] 5566 (8244) ; dam, Sonsie (imp.) [996].

SWEEPSTAKES, BEST CLYDESDALE STALLION, ANY AGE, IMPORTED OR CANADIAN BRED, PRESENTED BY INDUSTRIAL EXHIBITION ASSOCIATION—GOLD MEDAL.

1st. Lyon Macgregor [2308]. Exhibitor, Robert Davies, Toronto.

DRAUGHT PAIR OF MARES OR GELDINGS, ANY BREED WHATEVER, SHOWN IN HARNESS. ONE PRIZE GIVEN BY THE TORONTO ELECTORAL DISTRICT AGRICULTURAL SOCIETY.

1st. Rose of Blanchard [2462], bay ; King, b.g., 5 years old. Exhibitor, Geo. Moore, Waterloo, Ont.
2nd. Sunbeam, bay m.; Starlight [2278] bay m. Exhibitors, D. & O. Sorby, Guelph, Ont.
3rd. Rose, dark brown m.; Perth, dark brown g. Exhibitor, Wm. Bell, Elder's Mills, Ont.

PAIR OF MARES OR GELDINGS, SIRED BY A REGISTERED CLYDESDALE HORSE, SHOWN IN HARNESS.

1st. Diana McKay [2314], bay ; Sonsie Lass [2313], bay. Exhibitors, D. & O. Sorby, Guelph, Ont.

HARNESS, SADDLE HUNTING AND SPECIAL CLASSES.

HORSES IN HARNESS.

MARE OR GELDING, NOT EXCEEDING 15 HANDS 2 INCHES. TO BE SHOWN TO A GIG, CART OR PHAETON.

JUDGES :—Orson Moulton, Batavia, N.Y.; F. C. Hutton, V.S., Welland ; G. R. Hulme, New York.

1st. Golden, ch.g. 15.2, 5 years. Exhibitors, Crow & Murray, Toronto.
2nd. Rarebit, b.g., 15.1, 8 years. Exhibitor, Adam Beck, London.
3rd. Godiva, ch.m., 15.2, 5 years. Exhibitor, George Pepper, Toronto.

MARE OR GELDING, OVER 15 HANDS 2 INCHES HIGH, TO BE SHOWN TO A GIG, DOG CART OR PHAETON.

1st. The General, blk.g., 15.3, 6 years. Exhibitors, Crow & Murray, Toronto.
2nd. Glenalda, b.m., 15.3, 5 years. Exhibitors, Crow & Murray, Toronto.
3rd. Miss Alice, br.m., 16, 5 years. Exhibitor, E. B. Clancy, Toronto.

PAIR OF HORSES, OVER 15 HANDS 2 INCHES. TO BE SHOWN TO AN APPROPRIATE FOUR-WHEELED VEHICLE.

1st. Glenalda, b. m., 15.3, 5 yrs.; Glenaldyne, b. m., 15.3, 6 yrs. Exhibitors, Crow & Murray, Toronto.
2nd. Bianco—76—Jessica—25—. Exhibitor, R. Beith, M.P., Bowmanville.
3rd. Monte Christo, ch. g.; St. Elmo, ch. g. Exhibitor, S. F. McKinnon, Toronto.

PAIR OF HORSES, NOT UNDER 15 HANDS 2 INCHES. TO BE SHOWN BEFORE A BROUGHAM. HORSES TO COUNT 60 PER CENT., BROUGHAM AND GENERAL APPOINTMENTS 40 PER CENT.

1st. Sampson, b. g., 16 ; Dewey, b. g., 16. Exhibitor, G. H. Gooderham, Toronto.
2nd. Goldust, ch. g., 15.3½ ; Harry C., ch. g., 15.3½. Exhibitor, J. Ross Robertson, M.P., Toronto

TANDEMS.

HARNESS TANDEMS, WHEELER TO BE OVER 15 HANDS.

1st. Glenalda, b. m.; Glenaldyne, b. m. Exhibitors, Crow & Murray, Toronto.
2nd. Marie, b. m.; Grace Darling, b. m. Exhibitor, W. H. Smith, Toronto.
3rd. Sir Wilfrid, roan g.; Harry C., ch. g. Exhibitor, J. Ross Robertson, M.P., Toronto.

FOUR-IN-HANDS.

TEAMS NOT UNDER 15 HANDS. MAY BE SHOWN BEFORE A COACH, DRAG OR BRAKE.

1st. Exhibitor, A. Yeagher, Simcoe.
2nd. Exhibitor, R. Beith, M.P., Bowmanville.
3rd. Exhibitor, J. Ross Robertson, M.P., Toronto.

SADDLE HORSES.

BEST SADDDLE AND HARNESS HORSE, MARE OR GELDING, 15 HANDS AND OVER. TO BE FIRST SHOWN IN AN APPROPRIATE VEHICLE AND JUDGED AS A HORSE BEST SUITED FOR HARNESS PURPOSES, THE HORSE TO BE UNHARNESSED IN THE RING AND TO BE SHOWN AND JUDGED UNDER SADDLE. THE HORSE BEST SUITED FOR BOTH THESE PURPOSES TO BE AWARDED FIRST PRIZE.

1st. Bamboo, b. g., 16, 6 yrs. Exhibitor, L. Meredith, London.
2nd. Rosebud, b. m., 15.3, 5 years. Exhibitor, W. R. McBryen, Toronto.
3rd. Lady Crow, ch. m., 15.3, 4 yrs. Exhibitors, Crow & Murray, Toronto.

MARE OR GELDING, OVER 14 HANDS 2 INCHES, AND NOT EXCEEDING 15 HANDS 2 INCHES.

1st. Bonnie Doon, gr. m., 15.2, 5 yrs. Exhibitors, Crow & Murray, Toronto.
2nd. The Sculptor, br. g. 15.2, 7 yrs. Exhibitor, A. R. Curzon, Guelph.
3rd. Rosebud, br. m., 15.2, 4 years. Exhibitor, Geo. Pepper, Toronto.

MARE OR GELDING, OVER 15 HANDS 2 INCHES.

1st. ——— ———. Exhibitor, A. R. Curzon, Guelph.
2nd. Bamboo, b. g., 16 6 yrs. Exhibitor, L Meredith, London.
3rd. Alarm, gr. g., 15.2, 5 yrs. Exhibitors, O'Neil & Co., London.

LADIES' SADDLE HORSE, NOT UNDER 14 HANDS 3 INCHES.

1st. Brinba, ch. m., 15.1½, 10 yrs. Exhibitor, Miss L. Janes, Toronto.
2nd. Sampson, ch. g. Exhibitor, Dr. Andrew Smith, Toronto
3rd. Headlight, b. g., 15.3½, 5 yrs. Exhibitor, A. R. Curzon, Guelph.

SPECIAL PRIZE FOR HORSES RIDDEN BY LADIES. HORSES SHOWN BY DEALERS NOT ELIGIBLE.

1st. Viking, ch. g., 15.3½, 7 yrs. Exhibitor, Dr. Peters, Toronto.

HUNTERS AND JUMPERS.

QUALIFIED HUNTERS, HEAVYWEIGHT, UP TO CARRYING 180 LBS. CONFORMATION AND QUALITY TO COUNT 60 PER CENT., PERFORMANCE OVER FENCE TO COUNT 40 PER CENT. TO CARRY AT LEAST 168 LBS.

JUDGES:—Maj.-Gen. Hutton, Ottawa; C. McEachern, Montreal; Trumbell Carey, Batavia, N.Y.

1st. Westminster Belle, ch. m., 16.1, 6 yrs. Exhibitor, Adam Beck, London.
2nd. Veto, b. g., 16.1, 8 yrs. Exhibitor, Dr. Peters, Toronto.
3rd. Brian Boru, b. g., 16.1, 7 yrs. Exhibitor, E. Phillips, Toronto.

QUALIFIED HUNTERS, LIGHTWEIGHT, UP TO CARRYING 150 LBS. TO HOUNDS.

1st. Viking, ch. g., 15.3½, 7 yrs. Exhibitor, Dr. Peters, Toronto.
2nd. Bouncing Shot, br. g., 16, 5 yrs Exhibitor, Adam Beck, London.
3rd. Headlight, b. g., 15.3½, 5 yrs. Exhibitor, A. R. Curzon, Guelph.

GREEN HUNTERS, HEAVYWEIGHT, UP TO CARRYING 180 LBS. TO HOUNDS.

1st. The Bard, br. g., 15.3, 5 yrs. Exhibitor, Geo. Pepper, Toronto.
2nd. The Senator, ch. g., 16, 5 yrs. Exhibitor, Geo. Pepper, Toronto.
3rd. Dispute, gr. g., 16, 5 yrs. Exhibitors, Crow & Murray, Toronto.

GREEN HUNTERS, LIGHTWEIGHT, UP TO CARRYING 150 LBS. TO HOUNDS.

1st. Lady Aberdeen, b. m., 16, 6 yrs. Exhibitor, Geo. Pepper, Toronto.
2nd. Hugo, br. g., 16, 6 yrs. Exhibitor, H. S. Mara, Toronto.
3rd. Lady Elgin, ch. m., 16, 5 yrs. Exhibitor, Adam Beck, London.

JUMPING. OPEN TO ALL. PERFORMANCES OVER FENCES ONLY TO COUNT.

1st. Lady Aberdeen, b. m. Exhibitor, Geo. Pepper, Toronto.
2nd. Veto, b. g., 16.1, 8 yrs. Exhibitor, Dr. Peters, Toronto.
3rd. The Senator, ch. g. 16, 5 yrs. Exhibitor, Geo. Pepper, Toronto.

FOR THE BEST PERFORMANCE OVER SIX JUMPS, 2 AT 4 FEET, 2 AT 4 FEET 6 INCHES, 2 AT 5 FEET CARRYING NOT LESS THAN 140 LBS.

1st. Veto, b. g. Exhibitor, Dr. Peters, Toronto.
2nd. Westminster Belle, ch. m. Exhibitor, Adam Beck, London.
3rd. Heatherbloom, b. g., 16, 4 yrs. Exhibitors, Crow & Murray, Toronto.

CORINTHIAN CLASS. OPEN TO HUNTERS. HORSES MUST BE RIDDEN BY MEMBERS OF SOME RECOGNIZED HUNT. CONFORMATION AND QUALITY TO COUNT 25 PER CENT., PERFORMANCE OVER FENCES 75 PER CENT.

1st. Lady Aberdeen, b. m. Exhibitor, Geo. Pepper, Toronto.
2nd. Headlight, b. g. Exhibitor, A. R. Curzon, Guelph.
3rd. Victoria, b.m. Exhibitor, A. R. Curzon, Guelph.

SPECIAL PRIZE FOR HORSES OWNED AND RIDDEN BY MEMBERS OF SOME RECOGNIZED HUNT.

1st. Viking, ch. g., 15.3½, 7 yrs. Exhibitor, Dr. Peters, Toronto.

ROADSTERS.

(Standard or non-standard.)

MARE OR GELDING.

1st. Excellence, b. g., 15.1, 3 yrs. Exhibitor, J. J. Burns, Toronto.
2nd. Frank, b. g., 6 yrs. Exhibitor, J. C. Dietritch, Galt.
3rd. Geo. S. James, blk. g., 15.3. Exhibitor, E. W. Cox, Toronto.

PAIR OF MARES OR GELDINGS.

1st. Frank, br. g.; Lucy, br. m. Exhibitor, J. C. Dietrich, Galt.
2nd. Trilby, b. m., 15.2; Pete, b. g., 15.2. Exhibitor, F. J. Gallanough, Thornhill.

PONIES.

PONY IN HARNESS, 14 HANDS AND UNDER.

1st. Diamond, br. g., 13.2, 8 yrs. Exhibitor, Wm. Boddy, Toronto.
2nd. Daisy, blk. m., 13. Exhibitor, H. Russell, Toronto.

JUMPING CLASS.

PONIES, 13.2 HANDS AND UNDER. TO BE RIDDEN BY BOYS NOT OVER 14 YEARS OF AGE. PERFORMANCES OVER FENCES ONLY TO COUNT.

1st. Greta. Exhibitor, Robt. Davies, Toronto.
2nd. Snap. Exhibitor, Thos. Irving, Winchester.

JUMPING CLASS.

PONIES OVER 13.2 HANDS AND UNDER 14.3 HANDS. TO BE RIDDEN BY BOYS.

1st. Duty, b. m. Exhibitor, Lieut. Burnham, Stanley Barracks.
2nd. Guelph Girl, ch. m. Exhibitors, Crow and Murray, Toronto.

SPECIAL CLASSES.

Best and best appointed pair of horses to be shown to Landau. Best and best appointed pair of horses to be shown to Victoria. Single horse to be shown to Brougham. Each exhibitor must show in all three of the above events. Horses and carriages must be the *bona fide* property of the exhibitor, and must have been used in livery work for at least two months before the date of show. Horses to count 60 per cent. Carriages and appointments 40 per cent.

1st. Exhibitor, F. Doane, Toronto.

Mare or Gelding, to be shown in single harness and delivery waggon, actually as used in local deliveries. Horse to count 50 per cent., waggon and equipment 50 per cent. Horse to have been owned and actually used in delivery by exhibitor two months before date of exhibition.

1st. Exhibitor, M. Rawlinson, Toronto.
2nd. Exhibitor, Dominion Express Co., Toronto.

Mare or gelding, to be shown in single harness and butcher's cart, or used in local deliveries. Horse to count 50 per cent., cart and equipment 50 per cent. Horse to have been owned and actually used by exhibitor two months before date of show.

1st. Exhibitor, R. Scott, Toronto.
2nd. Exhibitor, J. W. Holman, Toronto.

Best performance of Professional Private Coachman, in livery, with pair and carriage to Landau, Brougham or heavy Victoria.

1st. John Pierce, coachman for E. Gurney, Toronto.
2nd. H. J. Middleton, coachman for D. Mackay, Toronto.
3rd. Jas. Morton, coachman for Geo. Gooderham, Toronto.

HUNTING TANDEM.

The leader to be a qualified hunter as previously defined. The wheeler to be over 15.2 hands. To be first judged as a tandem; then the leader to be saddled in the ring, and shown over the regulation jumps. Tandem to count 50 per cent. Performance over jumps 40 per cent. Appointments 10 per cent. To be ridden and driven by amateurs.

1st. Exhibitor, Adam Beck, London.
2nd. Exhibitor, Dr. Peters, Toronto.

OTHER LIVE STOCK ASSOCIATIONS.

In 1886 *The Agriculture and Arts Act* was amended by adding the following as one of the duties of the Council of the Agriculture and Arts Association:

"By keeping registers of pure-bred stock either by themselves or conjointly with other associations or bodies corporate." Chap. 11, sec. 28, s.s. 10.

In 1895, when the said Agriculture and Arts Association was discontinued, the following was added to section 48 of *The Agriculture and Arts Act*:

"The keeping of registers of pure-bred stock heretofore delegated to the Council of the Agriculture and Arts Association in accordance with section 28 of *The Agriculture and Arts Act*, sub-sec. 10, is hereby transferred to the various associations or bodies corporate heretofore engaged in such work conjointly with the said Council."

The reports are hereby added of the following Associations carrying on the registration of live stock in accordance with the above provisions of the Act.

DOMINION SHORTHORN BREEDERS' ASSOCIATION.

DOMINION AYRSHIRE BREEDERS' ASSOCIATION.

HEREFORD BREEDERS' ASSOCIATION.

HACKNEY HORSE SOCIETY.

CLYDESDALE HORSE BREEDERS' ASSOCIATION.

SHIRE HORSE BREEDERS' ASSOCIATION.

DOMINION SHORTHORN BREEDERS' ASSOCIATION.

OFFICERS FOR 1899.

President : JAMES RUSSELL, Richmond Hill, Ont.
First Vice-President : JOHN I. HOBSON, Guelph, Ont.
Second Vice-President : ROBERT MILLER, Stouffville, Ont.

Ex-Presidents—Life Members :

HON. JOHN DRYDEN, Brooklin, Ont. RICHARD GIBSON, Delaware, Ont.
A. JOHNSTON, Greenwood, Ont.

Vice-Presidents from Provinces :

WILLIAM LINTON, Aurora, Ont. GEO. A. FAWCETT, Sackville, N.B.
F. G. BOVYER, Georgetown, P.E.I. D. W. SHATTUCK, Davisburg, Alta.
J. H. LADNER, Ladner's Landing, B.C. C. A. ARCHIBALD, Truro, N.S.
JAMES A. COCHRANE, Hillhurst, Que. W. E. HEUBACH, Touchwood Hills, Assa.
HON. THOS. GREENWAY, Crystal City, Man.

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A. List.	C. List	B. List.
EDWARD JEFFS, Bondhead.	W. G. CARGILL, Cargill.	W. J. BIGGINS, Clinton,
H. SMITH, Hay.	ALEX. SMITH, Maple Lodge.	DAVID RAE, Fergus.
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Executive and Finance Committee : JAMES RUSSELL, Richmond Hill, Ont., Pres. ; JOHN I. HOBSON, Guelph, Ont. ; WILLIAM LINTON, Aurora, Ont. ; ROBERT MILLER, Stouffville, Ont. ; ARTHUR JOHNSTON, Greenwood.

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Delegates to Central Fair, Ottawa : R. R. SANGSTER, Lancaster, Ont. ; D. MCLAREN, Dunmore, Ont.

Delegates to Provincial Exhibttion, Nova Scotia : C. O. CHASE, Church Street, Cornwallis, N.S. ; C. W. HOLMES, Amherst, N.S.

Delegates to Provincial Exhibition, New Brunswick : SENATOR JOSIAH WOOD, Sackville, N.B. ; GEORGE A. FAWCETT, Sackville, N.B.

Delegates to Provincial Exhibition, Prince Edward Island : C. C. GARDINER, Charlottetown, P.E.I. ; F. G. BOVYER, Georgetown, P.E.I.

Secretary and Editor : HENRY WADE.

MEMBERS OF THE DOMINION SHORTHORN BREEDERS' ASSOCIATION FOR 1898-99.

Name.	Address.	Name.	Address.
Adams, Mrs. Jas	Oro Station, Ont.	Biggins, W. J	Clinton, Ont.
Adams, William	High River, Alta.	Bingaman, D.	Washington, Ont.
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Allin & Bros., Thomas	Oshawa, Ont.	Black, W.	Riversdale, Ont.
Allingham, D	Hawkestone, Ont.	Blanshard, C. H	Appleby, Ont.
Alton & Sons, Thomas	Appleby, Ont.	Blanshard, David E	Appleby, Ont.
Alton, A. P	Appleby, Ont.	Blyth, C. & G. W	Marden, Ont.
Alton, William E	Nelson, Ont.	Boles, Thomas	Eden Mills, Ont.
Anderson, Thomas	Mount Forest, Ont.	Bolton, James	Dewdney, Alta.
Anderson, Wm	Castleavery, Man.	Bolton, A. & F.	Marden, Ont.
Anderson, William	Whitby, Ont.	Bone, Adam	Paris, Ont.
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Arkell, Peter	Teeswater, Ont.	Bovyer, F. G	Georgetown, P.E.I.
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Armstrong, Geo	Speedside, Ont.	Bowles, W. H	Manitou, Man.
Armstrong, Jas. S	Fergus. Ont.	Bowman, W. R	Mount Forest, Ont.
Armstrong, Jno	Pilot Mound, Man.	Bradwin, E. W	Mount Forest, Ont.
Armstrong, William	Mosside, Ont.	Brady, Thomas	Chatham, Ont.
Armour, Andrew	Dunnville, Ont.	Brandon, J. H	Fenelon Falls, Ont.
Arnald & Son, H. G	Maidstone Cross. Ont.	Brandon, William	Napanee, Ont.
Ashley, H. H	Helena, Mont, U.S.	Brash, William	Ashburn, Ont.
Avery, Jno	Clinton, Ont.	Bratt, Jesse	Yellow Grass, Assa.
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		Breen, J. F	Melancthon, Ont.
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Baker, Thomas	Solina, Ont.	Bright & Sons, W	Raglan, Ont.
Baker & Son, J. A	Bennington, Ont.	Bristow, George B	Rob Roy, Ont.
Baker, Wm	Crystal City, Man.	Broadfoot, James	Seaforth, Ont.
Barclay, Luther	Port Hope, Ont.	Brodie, G. A	Bethesda, Ont.
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Bateman Bros	Christina, Ont.	Brown, A. & D	Iona, Ont.
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Bell, Jas.	Markdale, Ont	Burch, D. B	Lambeth, Ont.
Bell, James	Lauriston, Ont.	Burchill, B	Coboconk, Ont.
Bell, John	Seeburn, Man.	Burnett, Jno	Winterbourne, Ont.
Bell, Joseph	Bradford, Ont.	Burnett, W. A.	Salem, Ont.
Benham, Jas. W	Rockwood, Ont.	Burnett, Leonard	Greenbank, Ont.
Benner, W. R	Alvinston, Ont.	Burns, Alexander	Rockwood, Ont.
Bennie, G. & W	Castleavery, Man.	Burns, David	Brooklin, Ont.
Betschen, G	New Dundee, Ont.	Burridge, Albert G.	Rutherford, Ont.
Betzner, Ephraim S	Conestogo, Ont.	Burton, Robert	Lennoxville, Que.
Bice, Artemus	Clandeboye, Ont.	Burt, Robert.	St. George, Ont.

LIST OF MEMBERS.—*Continued.*

Name.	Address.	Name.	Address.
Calder, Charles	Brooklin, Ont.	Copeland, Thomas	Saskatoon, Sask.
Calder, W. M	Glanford, Ont.	Cordingly, D	Lisgar, Man.
Caldwell, Alfred	Crown Hill, Ont.	Cords, Frederick	Walkerton, Ont.
Callahan, M. S	Haysville, Ont.	Corley, Richard	Belgrave, Ont.
Cameron, John	Crieff, Ont	Corneil, D. H	Omemee, Ont.
Cameron, John	Carlyle, Assa.	Cousins & Sons, John	Harrison, Ont.
Campbell, Alex	Cromarty, Ont.	Cowan & Sons, James	Galt, Ont.
Campbell, A. & J	Harriston, Ont.	Cowan, James	Guelph, Ont.
Campbell, A. & J	Ridgetown, Ont.	Cowan, James	Seaforth, Ont.
Campbell & Son, D	St. Thomas, Ont.	Craig, J. A	Portage la Prairie, Man.
Campbell, John A	Lawrence Station, Ont.	Cram, John	Deloraine, Man.
Campbell Bros., J	Crosshill, Ont.	Creamer, A. E	Baldur, Man.
Campbell, James K	Palmerston, Ont.	Crerar & Sons, James	Shakespeare, Ont.
Campbell, John	Woodville, Ont.	Cross, A. E	Calgary, Alta.
Campbell, Joseph	Janetville, Ont.	Crozier, John	Meadowvale, Ont.
Campbell, Mac	Northwood, Ont.	Crozier, A.	Beachburg, Ont.
Campbell, Peter	Amberly, Ont.	Cudmore & Son, Thomas	Lumley, Ont.
Campbell, Roland	Dunbarton, Ont.	Cullis, John & W. H	Powle's Corners, Ont.
Campbell, W. B	Campbellcroft, Ont.	Cummings, John	Rockwood, Ont.
Can. Land & Ranch Co.	Crane Lake, Alta.	Cummings, J. G	Luck's Landing, B.C.
Cargill & Son, H	Cargill, Ont.	Cunningham, John	Norval, Ont.
Carnochan, William	Edmondville, Ont.	Cuntry, Chas	Shoal Lake, Man.
Carpenter, W. S	Simcoe, Ont.	Cutler & Son, Elis	Coldstream, Ont.
Carroll, Chas. W	Norwich, Ont.		
Carruthers, C. & J	Cobourg, Ont.	Daering, Henry	Milverton, Ont.
Carruthers & Son, H	Cobourg, Ont.	Dale, Robert	Brampton, Ont.
Carswell, James	Renfrew, Ont.	Dale, William	St. Mary's, Ont.
Cassidy, Neil	Port Elgin, Ont.	Darke & Son, Richard	Lindsay, Ont.
Caswell, J. J	Osler, Sask.	Daunais, C. M	Battleford, Sask.
Caswell, Jos	Osler, Sask.	Davidson, Chas	Acton, Ont
Catron, Wm	Snelgrove, Ont.	Davidson, J. Fred	Peterborough, Ont.
Central Canada Ex. Co.	Ottawa, Ont	Davidson & Son, James I.	Balsam, Ont.
Central Experim'l Farm.	Ottawa, Ont.	Davidson, John	Ashburn, Ont.
Chadburn, A & J	Ralphton, Man.	Davis, Edward	Emerson, Man.
Chalmers, William	Hayfield, Man.	Davis, C. J	Freeman, Ont.
Chambers, William	Currie's Crossing, Ont.	Davis, H. J	Woodstock, Ont.
Chapman, John G	St. Thomas, Ont.	Davis, J. F	Tempo, Ont.
Charters, Robert	Egmondville, Ont.	Dawson, Adam	Cannington, Ont.
Chase, E. & O	Church St, Cornwallis, NS	Dawson, Peter	South Monaghan, Ont.
Cheasley, Fred	Alexander, Man.	Dawson, William	Vittoria, Ont.
Cheyne, James	Oxbow, Assa.	Day, John F	Fleming, Assa.
Chinnick, J. & E	Chatham, Ont.	Deans, William J. & L.	Fergus, Ont.
Chisholm, T. B	Hornby, Ont.	De Courcey, Daniel	Bornholm, Ont.
Clark, Aaron	Aurora, Ont.	De Guerre, Peter	Queensville, Ont.
Clark, David	Carder, N. Dak., U.S.	De Long, R. F	Brooklin, Ont.
Clark, William	Greenwood, Ont.	Deyell, Jas	Wallace, Ont.
Claus, W. W	Vineland, Ont.	Dickie, George	Hyde Park, Ont.
Clayton, George	Peepabun, Ont.	Dickison, Rich'd	Guelph, Ont.
Cleave, Jas	Georgetown, Ont.	Dickieson, W. A	Eramosa, Ont.
Cleghorn, J. W	Mosborough, Ont.	Dickison, William	Mildmay, Ont.
Coad & Sons, R	Strathburn, Ont.	Dickson, Jno. F	Goderich, Ont.
Coakwell, William	Green River, Ont.	Dickson, John M	Innisfail, Alta.
Coates, W. H	Claremont, Ont.	Dixon, Bros	Maple Creek, Assa.
Cochrane, James A	Hillhurst, Que.	Dobie, Alex	Chesley, Ont.
Cochrane, Peter	Almonte, Ont.	Dobson, Robert	Epsom, Ont.
Cochrane, Andrew	Almonte, Ont.	Docker, F. T	Dunnville, Ont.
Coleman, T. J	Markdale, Ont.	Dodds, John	Arkwright, Ont.
Colquhoun, Thomas	Gowrie, Ont.	Doidge, George	Plainville, Ont.
Connolly, John	Lindsay, Ont.	Dolson, Samuel	Alloa, Ont.
Conway, Jas	Alliston, Ont.	Donaldson, William	South Zorra, Ont.
Cook, A. L	Corinth, Ont.	Dorrance, James	Seaforth, Ont.
Cook, James	Myrtle, Ont.	Douglas, James	Caledonia, Ont.
Cook, jun., John	Amulree, Ont.	Douglas & Sons, Thomas	Strathroy, Ont.
Cook, Theo	Glen William, Ont.	Douglas & Switzer	Kintore, Ont.
Cooper, E. E	Oshawa, Ont.	Dow, Neil	Tara, Ont.
Cooper, J. V	Picton, Ont.	Dow, Peter	Fergus, Ont.

LIST OF MEMBERS—*Continued.*

Name.	Address.
Doyle, John.	Elora, Ont.
Doyle, Maurice	Ayton, Ont.
Doyle, R. J	Owen Sound, Ont.
Dredge & Son, William	Nassagaweya, Ont.
Drummond, A. & J	Clifford, Ont.
Dryden, Hon. John	Brooklin, Ont.
Drysdale, Jas. W	Neepawa, Man.
Duck, W. J	Morpeth, Ont.
Duckworth, John	Vanessa, Ont.
Duff, Robert	Myrtle, Ont.
Duff, Thos	Dobbinton, Ont.
Dugan, James	Castleavery, Man.
Dunlop, Samuel	Eady, Ont.
Duthie, James	Melgund, Man.
Dyer, D. D	Columbus, Ont.
Dyer, John E	Enfield, Ont.
Dyment, S	Barrie, Ont.
Eagleson, A. E	Cold Springs, Ont.
Eakens, Robt	Glandine, Ont.
Easterbrook, W. H	Freeman, Ont.
Eby, Reuben	Winfield, Ont.
Edwards Bros	Watford, Ont.
Edwards & Co., W. C	Rockland, Ont.
Elgie, Joseph	Dresden, Ont.
Elliott, H. J	Danville, Que.
Elliott, W. R	Hespeler, Ont.
Ellis, T. W	Clifford, Ont.
Elrick, William	Hillsdale, Ont.
Erwin, David	Villa Nova, Ont.
Evans, A.	Chilliwack, B.C.
Evans, Jno. C	Grimesthorpe, Ont.
Fairbairn, H. K	Thedford, Ont.
Fallows, H. S	Evelyn, Ont.
Faris, P. M	Bradford, Ont.
Farr, C. A	Petrolea, Ont.
Fa quier, H. H	Maple Creek, Assa.
Fenner, A. R	Ruscom Station, Ont.
Ferguson Bros	St. Thomas, Ont.
Ferguson, Jas	Salem, Ont.
Ferguson, James	Thamesville, Ont.
Ferres & Son, James	Whitfield, Ont.
Ficht, Valentine	Oriel, Ont.
Field, H. & B	Laurel. Ont
Fields, Wm	Allerton, Ont.
Fisher, Wm	Malvern, Ont.
Fisher, William	Ashgrove, Ont.
Fitzgerald Bros	Mount St. Louis, Ont.
Flatt, D. C.	Mill Grove, Ont.
Flatt, W. D	Hamilton, Ont.
Fleming, Alex	Kilsyth, Ont.
Fleming, jun., Alexander	Kilsyth, Ont.
Fletcher, John	Binkham, Ont.
Foley, R. D	Manitou, Man.
Forbes, Geo	Winterbourne, Ont.
Forbes, W. J	Listowel, Ont.
Forth Bros.	Glen Buell, Ont.
Foster, Stewart	Killarney, Man.
Found, James	Dumbarton, Ont.
Franklin, Frank	Shirley, Ont.
Fraser & Sons, D	Emerson, Man.
Fraser, R. P	Minnedosa, Man.
Freestone & Son, C	Meaford, Ont.
Fried & Son, John	Roseville, Ont.
Fry, William	Sutton West, Ont.
Fulton, William	Brewster, Ont.
Furse Bros	Kintore, Ont.
Futcher & Son, Thomas	St. Thomas, Ont.
Fyfe, Geo	Gourock, Ont.
Fyfe, Thos	Cotswold, Ont.
Gainer, W. H	Welland, Ont.
Gallagher, Robert	Perm, Ont.
Gardhouse, C. S	Humber, Ont.
Gardhouse, H. A	Highfield, Ont.
Gardhouse, James M	Highfield, Ont.
Gardhouse, John	Highfield, Ont.
Gardiner, James	Grange, Man.
Gardiner, Jas	Farquharson, Ont.
Gardiner, Alex	Leadbury, Ont.
Gardner, F. A	Britannia, Ont.
Gardner, William	Ashburn, Ont.
Garnham, E. A	Straffordville, Ont.
Gaunt & Sons, E	St. Helen's, Ont.
George, John	Miami, Man.
George, Henry, M. D	Innisfail, Alta.
Getty, J. E	Fernhill, Ont.
Gibb, James	Brooksdale, Ont.
Gibson, H	Newcastle, Ont.
Gibson, Jno	Marden, Ont.
Gibson, John T	Denfield, Ont.
Gibson, Richard	Delaware, Ont.
Gibson, William	Wolesley, Assa.
Giddis, Willis	Ridgetown, Ont.
Gier, G	Grand Valley, Ont.
Giffen, Alexander	Snelgrove, Ont.
Gilbert, Matthew	St. Thomas, Ont.
Gillies, Wm	Pigeon Bluff, Man.
Gimbey, M.D., W. E	Chesley, Ont.
Glen, Jas	Lumley, Ont.
Glen, Robert	Owen Sound, Ont.
Glennie, Mrs. Wm	Winterbourne, Ont.
Golding, Henry	Thamesford, Ont.
Good, Thos	Richmond, Ont.
Goodfellow Bros	Macville. Ont.
Gordon, J. A	Acton.
Gordon, John	Derryville, Ont.
Gordon, Thomas J	Nottawa, Ont.
Gorwe l, S. B	Fanshawe, Ont.
Gowan, R. B	Allanford, Ont.
Graham, D. A	Ivan, Ont.
Graham, H. C	Ailsa Craig, Ont.
Graham, Jno. R	Lindsay, Ont.
Gowanlock, James	Port Elgin, Ont.
Gowanlock, John	Port Elgin, Ont.
Gowanlock, Robert	Maple Hill, Ont.
Graham, Andrew	Pomeroy, Man.
Graham, Thomas	Port Perry, Ont.
Graham, William	Port Perry, Ont.
Grainger & Son, William	Londesborough, Ont.
Grainger, Edward	Duncrief, Ont.
Green, Fred. W	Moose Jaw, Assa.
Greenway, Hon. Thomas	Crystal City, Man.
Greenway, Thomas	Woodville, Ont.
Greenwood, Thomas	Douglas, Man.
Griffith, J. & G	Wallace, Ont.
Groat, Chas	Brooklin, Ont.
Groff, Israel	Alma, Ont.
Grove, Jos	Lacomte, Alta.
Hagen, Jos	Armstrong's Mills, Ont.
Hager, A	Plantagenet, Ont.
Haid, Jno.	Hawkeville, Ont.

LIST OF MEMBERS—*Continued.*

Name.	Address.
Haining Bros	Highgate, Ont.
Hall, Michael	Wishart, Assa.
Hall, William	Cambray, Ont.
Hamilton, Wm	Bright, Ont.
Hammond, Alex	Wellesley, Ont.
Hand, Jno	Tancred, Ont.
Hans, Henry	Gladys, Alta.
Hanley, J. C	Reid, Ont.
Hardy, J. & G	Ashgrove, Ont.
Hargrave, James	Medicine Hat, Assa.
Hargrave, Thos	Mongolia, Ont.
Harman, R	Temperanceville, Ont.
Harrison & Son, John	Niverville, Man.
Hartman, J. W	Elmhedge, Ont.
Harvie, J. R	Orillia, Ont.
Harvie, C. E	Orillia, Ont.
Haskett, R	Park Hill, Ont.
Hawkshaw, W. S	Glanworth, Ont.
Hayward, H. H	Hayward, Assa.
Hay, Jas	Varney, Ont.
Hay, William	Tara, Ont.
Heacock, G. W	Aurora, Ont.
Helliwell, W. J	Oak Lake, Man.
Hendrie, William	Hamilton, Ont.
Henry, W. J	Wartburg, Ont.
Hermiston, Robert	Mount Forest, Ont.
Heron, J. & A	Ashburn, Ont.
Hill, David	Staffa, Ont.
Hill, George	Delaware, Ont.
Hilhouse, R	Broadview, Assa.
Hillis, James	Hanover, Ont.
Hind, H. E	Hagersville, Ont.
Hine, R. J	Dutton, Ont.
Hislop, Andrew	Brussels, Ont.
Hobson, John I	Guelph, Ont.
Hodgens & Son, Thomas.	Ettrick, Ont.
Hodgson, R	Clandeboye, Ont.
Hoffarth, Joseph	Carlsruhe, Ont.
Hogg & Son, William	Thamesford, Ont.
Holdsworth & Son, R.L.	Port Hope, Ont.
Hole Bros	Minnedosa, Man.
Hollingshead, J	Tottenham, Ont.
Holmes, Charles W	Amherst, N. S.
Holmes & Moore	Inwood, Ont.
Hope & Sons, T	Scugog, Ont.
Hortop, J. N	Kinsale, Ont.
Hosken, John	Bowmanville, Ont.
Hostetler, C	New Hamburg, Ont.
Houston, John	Chatham, Ont.
Howard, John L	Sutton West, Ont.
Howden, W. G	Columbus, Ont.
Hunt, W. D	Fairmide, Assa.
Hunter, Rich'd	Elimville, Ont.
Hyslop & Son, David	Killarney, Man.
Imerson, Jos	Wheatley, Ont.
Inkster, Wm	Underwood, Ont.
Innes & Son, James	Currie's, Ont.
Ireland, George	Nelson, Ont.
Irving, C. Harlstone	Newmarket, Ont.
Isaac, John	Markham, Ont.
Jackson, David	Newdale, Man.
Jackson, Jno	Scugog, Ont.
Jackson, George	Cumnock, Ont.
James, Walter	Rosser, Man.
Jamieson, David	Hillsdale, Ont.
Jamieson, John	Kirkwall, Ont.
Jamieson, John	Shrigley, Ont.
Jamieson, W. A	Craigvale, Ont.
Jamieson, William	Laurier, Ont.
Jasper, Thomas	Bradwardine, Man.
Jasper, Chas	Walkerton, Ont.
Jefferson, Jno	Virden, Man.
Jeffrey Bros	Whitby, Ont.
Jeffs & Son, Edward	Bondhead, Ont.
Jesten, John	Everton, Ont.
Jickling, Lemon	Norden, Man.
Johnson, F. W	Denver, Col., U. S.
Johnston, Arthur	Greenwood, Ont.
Johnston, Arthur	Vandeleur, Ont.
Johnston, Chas	Kemble, Ont.
Johnston, F. W	Union Stock Yards, Denver, Col., U. S.
Johnston, Jas	Orangeville.
Johnston, Jos	Virden, Man.
Johnston & Bro., John	Rutherford, Ont.
Johnston, George W	Balsam, Ont.
Johnston, Henry	Tara, Ont.
Johnston, H. M	Calder, Ont.
Johnston, James	Nortonville, Ont.
Johnston, James H	Hillsdale, Ont.
Johnston, Robt	Mono Mills, Ont.
Johnston, Samuel	Redgrave, Ont.
Jones Bros	Yellow Grass, Assa.
Jones & Sons, W. E	Yellow Grass, Assa.
Julien, Thomas	Heathcote, Ont.
Kay, Charles	Fergus, Ont.
Kealy, O. W	Battleford, Sask.
Kean, Jas	Orillia, Ont.
Kearns, John	Palmerston, Ont.
Kemp, Jno	Hazeldean, Ont.
Kerr, Thos	Two Creeks, Man.
Kilpatrick, Geo	Prince Albert, Ont.
King, William	Minnokin, Man.
Kinnear, L. H	Souris, Man.
Kirby, Jos	Armstrong's Mills, Ont.
Kirkwood, G	Chesley, Ont.
Kissock, A	Guthrie. Ont.
Kissock, S	Guthrie, Ont.
Kitely, J. J	Dunkerron, Ont.
Knox, Andrew	South Dummer, Ont.
Knox, William	South Dummer, Ont.
Kolb, Elias B	Berlin, Ont.
Kyle, James	Chesley, Ont.
Ladner, W. H	Ladner, B. C.
Laird, Richard	Thedford, Ont.
Laidlaw, Frank	Guelph, Ont.
Lamb, M	Acton, Ont.
Lane, H	Pownal, P.E.I.
Lang, R. L	Oak Lake, Man.
Lasby, W. A	Acton, Man.
Laviolette, Charles	Virginia, Ont.
Lawrence, Joseph	Clearwater, Man.
Lawr, J. C	Avon, Ont.
Laycock, Henry	Rosebank, Man.
Laycock, T	Rosebank, Man.
Leach, Geo	Columbus, Ont.
Learned, J. F	Cookshire, Que.
Leask, J.	Taunton, Ont.

LIST OF MEMBERS.—*Continued.*

Name.	Address.	Name.	Address.
Leask, Peter A	Virden, Man.	McGregor, John & J	Manitou, Man.
Leask, William	Dominion City, Man.	McGregor, Albert	Constance, Ont.
Leask, William G	Virden, Man.	McGugan, Chas	Cedar Springs, Ont.
Lee & Sons, John	Highgate, Ont.	McGurk, Henry	Colinville, Ont.
Legge, T. H	Temperanceville, Ont.	McIntosh, William	Burgoyne, Ont.
Lennox, D. W	Churchill, Ont.	McIntyre, Jas. & Archie	Campbellville, Man.
Lennox, James A	Thornton, Ont.	McIntyre, Ewen	St. Thomas, Ont.
Leslie, George	Acton, Ont.	McIntyre, John	Ashburn, Ont.
Lewis, George C	Kissina, Assa.	McIntyre, Judge, D. J	Whitby, Ont.
Lick, E. H	Oshawa, Ont.	McIver, John	Cape Croker, Ont.
Lindsay, S	Formosa, Ont.	McIver, Kenneth	Virden, Man.
Linton, William	Aurora, Ont.	McKay, Bros	Egmondville, Ont.
Lister, W. S	Middle Church, Man.	McKay, Matthew	Delaware, Ont.
Litt, Jacob	Sebringville, Ont.	McKechnie, N. G. & J.	Durham, Ont.
Littlejohns, J. C	Highgate, Ont.	McKenzie, Adam	Brooksdale, Man
Livingstone, Donald	Yorkton, Assa.	McKenzie, Alexander	Coningsby, Ont.
Livingstone, W. A	Allan Park, Ont	McKenzie, James	Burnside, Man.
Logan, Jno	Murchison, Man.	McKenzie, John	Chatsworth, Ont.
Logan, R. B	Thorndale, Ont.	McKenzie, sr., Kenneth	Burnside, Man.
Logie, H. C	Lindsay, Ont.	McKenzie, jr., Kenneth	Burnside, Man.
Loree, J. S	Everton, Ont.	McKenzie & Cooper	Battleford, Sask.
Loree, Wm	Everton, Ont.	McKimmell, J. A	Cochrane, Alta.
Lougheed, J. T	Britannia, Ont.	McKinnon, Alexander	Coningsby, Ont.
Lowes, Caleb	Bosworth, Ont.	McKinnon, D. J	Queen Hill, Ont.
Ludlow, Wm	Comber, Ont.	McLaggan, J. W	Ellerslie, Alta.
Lyle, Wm. N	Mud Creek, Ont.	McLaren, Wm	Scugog, Ont.
Lynch, Walter	Westbourne, Man.	McLaren, D	Dunmore, Ont.
		McLaren, Duncan	Cromarty, Ont.
McAllister, D	Comber, Ont.	McLean, Robert	Ellisboro', Assa.
McArthur, A. J	Paisley, Ont.	McLean, Jos	Hamiota, Man.
McArthur, Charles	Eden Mills, Ont.	McLenaghan, R	Minnedosa, Man.
McArthur, James	Gobles, Ont.	McLennan, Roderick	Moropano, Man.
McArthur, John	Paisley, Ont.	McMillan, D	Dutton, Ont.
McAvoy, T. C	Balsam, Ont.	McMillan, James A	Calgary, Alta.
McBain, Geo	Acton, Ont.	McMurray, Robert	Sunnidale, Ont.
McBeth, Donald	Oak Lake, Man.	McNab, John	Rockwood, Ont.
McCaig, Alexander	Aberfoyle, Ont.	McNaughton, Jas	Meaford, Ont.
McCallum, John	Iona Station, Ont.	McNeill, J. & C	Cavan, Ont.
McCallum, J. R	Iona Station, Ont.	McPhail, Bros	Sonya, Ont.
McCallum, Zacharia	Iona, Ont.	McPherson, William	Arkona, Ont.
McClure, T. A	Meadowvale, Ont.	McQuat, John	Stony Mountain, Man.
McColl, Samuel	Dutton, Ont.	McQueen, J. & R	Salem, Ont.
McCorkell, W. A	Fleming, Assa.	McRae, John	Teeswater, Ont.
McCorkindale, John	Guelph, Ont.	McRorie, Peter	Bruce Mines, Ont.
McCormick, Henry	Paris, Ont.	McTaggart, Alexander	Sonya, Ont.
McCue & Sons, Jas	Melancthon, Ont.	McTavish & Son, Peter	Gad's Hill, Ont.
McCullough, Robert	Science Hill, Ont.	McTavish, Donald	Gad's Hill, Ont.
McCurdy, S. D	Vienna, Ont.	Madigan, Jas	Caledonia, Ont.
McDermott, Wm. & J	Living Spring, Ont.	Main, John	Pentland, Ont.
McDiarmid, Peter	Belcourt, Man.	Maloney, P	Metropolitan, Ont.
McDonald, Dugald	Kinloss, Ont.	Mannerow, A. & L	Desboro, Ont.
McDonald, Peter	Amberley, Ont.	Manning, Chas.	Londesboro, Ont.
McDonald, Peter D	McLennan, Ont.	Mansfield, Jonathan	Brandon, Man.
McDonald Bros	Woodstock, Ont.	Marquis, George	Victoria Corners, Ont.
McDonald, D. K	Speedside, Ont	Marr, Joseph F	Grovesend, Ont.
McDonald, William	Pilot Mound, Man.	Marshall, James A	Binbrook, Ont.
McEachren Bros	Argyle, Ont.	Marshall, Joseph	Jackson, Ont.
McEwan, John	Delaware, Ont.	Marsh & Greely	Maple Creek, Assa.
McEwen, Jas	Drayton, Ont.	Martin, Arthur	Maple Creek, Assa.
McFarland, Jas	Hockey, Ont.	Martindale, F	York, Ont.
McFarland, John	Dutton, Ont.	Martin, John & W	Fenelon Falls, Ont.
McGarry, William	McGarry, Ont.	Martyn, J. W	Canton, Ont.
McGillawee, A.	Hampshead, Ont.	Mason & Son, W. J	Oliphant, Ont.
McGillawee, James	Amulree, Ont.	Masten, J. B	Lacolle, Que.
McGill Bros	Carroll, Man.	Matchett, Richard	Cavan, Ont.

LIST OF MEMBERS.—*Continued.*

Name.	Address.	Name.	Address.
Maud, W. H	Ospringe, Ont.	Oliver, William	Avonbank, Ont.
Menzies, Bros	Shoal Lake, Man.	Ontario Agricultural College	Guelph, Ont.
Menzies, John	Shoal Lake, Man.	Ormiston, Wm., jr	Columbus, Ont.
Menzies, W. & J	Kirkwall, Ont.	Orr, Alexander	Ralphtown, Man.
Mercer, Thomas	Markdale, Ont.	Osborne, J. F	Bowmanville, Ont.
Meyer, Geo. S	St. Clements, Ont.	Osler, H. P	Wolesley, Assa.
Meyer, John	Kossuth, Ont.	Owens, William	Montreal, Que.
Michael, John H	Green River, Ont.		
Michael, Robt. T	Brooklin, Ont.	Park, James	Vickers, Ont.
Michel, Conrad	Cranbrook, Ont.	Parker, Henry	Durham, Ont.
Miller, Robert	Stouffville, Ont.	Parker, T. R	Ivy, Ont.
Miller & Sons, John	Brougham, Ont.	Parkin, A	Kinsale, Ont.
Miller, James C	Akinside, Man.	Parkin, Thos	Primrose, Ont.
Miller, Wm	Markham, Ont.	Parkinson, E & C	Thornberry, Ont.
Miller, Mrs. John	Milton, Ont.	Parsons, Wm	Woodstock, Ont.
Millman, William	Dexter, Ont.	Patrick, Wm	Birr, Ont.
Milloy, Capt. D	Paris, Ont.	Patten, Frank I., M.D.	St. George, Ont.
Milne, David	Ethel, Ont.	Paterson, A. C	Lucknow, Ont.
Milne, Jas	Glanworth, Ont.	Patterson, J. W	Denfield, Ont.
Minthorn, Albert E	Powle's Corners, Ont.	Patterson, Thos	St. Marys, Ont.
Mitchell, James	Aberdour, Ont.	Patterson, Wm	Almonte, Ont.
Mitchell, James	Castleavery, Man.	Patterson, Wm	Eady, Ont.
Mitchell, John	Waterdown, Ont.	Patterson, Wm	Denfield, Ont.
Mitchell & Son, R	Nelson, Ont.	Paul Bros	Killarney, Man.
Moffat, John S	Pilot Mound, Man.	Payne, J. C	Cayuga, Ont.
Moffat, W. G	Teeswater, Ont.	Pearson & Son., S. G	Meadowvale, Ont.
Monk, Ephriam	Springford, Ont.	Pedlow, Wm	Hamiota, Man.
Montague & Son, A	Thamesford, Ont.	Pemberton & Son, F. B.	Victoria, B. C.
Moody, James	Ravenswood, Ont.	Pentland, T. G	Aikenside, Man.
Moore, Alexander	Greenwood, Ont.	Perdue, Henry	Campbell's Cross, Ont.
Moore, J. W	Manitou, Man.	Perry, Geo	Deloraine, Man.
Moore, H	Trowbridge, Ont.	Peter, Geo	Orchard, Ont.
Moore, Samuel	Cooksville, Ont.	Pettigrew, Henry	Norval, Ont.
Moore, W., jr	Lindsay, Ont.	Pettit, W. G	Freeman, Ont.
Moore, G. & W	Harriston, Ont.	Philip, Geo	Brougham, Ont.
Morgan, E. A	Kerrwood, Ont.	Philp, & Son, John	Dromore, Ont.
Morgan & Sons, John	Kerrwood, Ont.	Phin, R. J	Moosomin, Assa.
Morris, H	Goderich, Ont.	Pickett, D. W.	Andover, N.B.
Morrison, John	Brooklin, Ont.	Pincombe, R	Strathroy, Ont.
Morrison, John	Winthrop, Ont.	Playfair, A. W	Baldur, Man.
Morrison, H	Beaverton, Ont.	Plumsteel, H	Clinton, Ont.
Morrow, James	Silver Springs, Man.	Pointon, Wm	Harriston, Ont.
Morton, F. G	Allandale, Ont.	Pollock, D	Chesley, Ont.
Morton, M.D., E. D	Barrie, Ont.	Polworth, Jas	Carberry, Man.
Moyer, George O	St. Clements, Ont.	Porter, Jno. J	Humber, Ont.
Mullholland, J. T	Baltimore, Ont.	Porter, Wm. E	Humber, Ont.
Murdie, Michael	Winthrop, Ont.	Porter, Mrs. Charles E	Petrolea, Ont.
Murray, Charles	Stamford, Ont.	Porter, William	Lloydtown, Ont.
Naisbitt, Bright	Rapid City, Man	Porter, Hugh A	Caledon, Ont.
Naisbitt, William	Rapid City, Man.	Potter, Jas	Blyth, Ont.
Neilson, Allan	Napanee, Ont.	Powers & Son, Simon	Orono, Ont.
Nelles, F. A	York, Ont.	Preston, Richard	Leamington, Ont.
Newton, Wm	Limehouse, Ont.	Pritchard, R. J	Prince Albert, Sask.
Nichol, Alex	Alexander, Man.	Proctor, Jas	Argyle, Man.
Nichol & Son, E	Bo'ssevain, Man.	Proctor, J. H	Virden, Man.
Nichol, Robert	Hagersville, Ont.	Prophet, S	Brechen, Ont.
Nicholson, R. & S	Sylvan, Ont.	Prout, George W	Zephyr, Ont.
Noble, Francis	Wawanessa, Man.	Pugh, David E	Claremont, Ont.
Noble, R	Norval, Ont.	Pugh, George E	Whitevale, Ont.
Norris, H	Cronarty, Ont.	Pugh, O. H	Whitevale, Ont.
Norris Bros	Ravenshoe, Ont.		
Nott, Thomas	MacLellan, Algoma, Ont.	Querengessor, C	Brodhagen, Ont.
Oke, Jas	Alvinston, Ont.	Rae, David	Fergus, Ont.
Oliver, George	Galt, Ont.	Raikes, George	Barrie, Ont.

LIST OF MEMBERS.—*Continued.*

Name.	Address.
Raikes, Henry	Pine Lake, Alta.
Ramsay & Son, William	Eden Mills, Ont.
Rankin, A.	Paisley, Ont.
Rankin, Charles	Wyebridge, Ont.
Rankin, George	Hamiota, Man.
Rankin, Samuel	Fairview, Ont.
Rawlings, Heber	Forest, Ont.
Rawlings, Fred	Forest, Ont
Ray, Hugh A.	Glandine, Ont.
Redmond, Thos.	Millbrook, Ont.
Redmond, William	Millbrook, Ont.
Reid, E. Osborne	Cochrane, Alta.
Reid, George A.	Cochrane, Alta.
Reid, Robert	Forrest Station, Man.
Reid, Robt. H.	Crumlin, Ont.
Reiner, S. F	Neustadt, Ont.
Renfrew Cattle Club	Renfrew, Alta.
Rennie, James	Wick, Ont.
Rennie, Jno	Teviotdale, Ont.
Rennelson, R.	Galt, Ont.
Renwick, R. & J. S.	Carberry, Man.
Renton, John	Deloraine, Man.
Reynolds, Martin	Harriston, Ont.
Riddle, James	Beeton, Ont.
Rilance, R.	Beaverton, Ont.
Risely, E. E	Bridgeburg, Ont.
Risenborough, M.	Mount Albert, Ont.
Robb, Peter B	Nepawa, Man.
Robertson, Archibald	Eden Mills, Ont.
Robertson, A. R.	Nithburg, Ont.
Robertson, John	Wyoming, Ont.
Robertson, Joseph	Romney, Ont.
Robertson, P	Brussels, Ont.
Robinson, E. L. & W. G.	Wallace, Ont.
Robinson, Charles	Odelltown, Que.
Robinson, Thomas	Kintore, Ont.
Robson, J. G. & R. S.	Ilderton, Ont.
Robson, J. S.	Manitou, Man.
Robson, T. E.	Ilderton, Ont.
Rock, John	Springford, Ont.
Ross Bros	Nairn, Ont.
Ross, John C., jr.	Jarvis, Ont.
Ross, J. A.	Maple Creek, Assa.
Ross, J. S	Winchester, Ont.
Rosser, D. W.	Denfield, Ont.
Roth, John N.	Tavistock, Ont.
Routledge, Elmore	Lambeth, Ont.
Routledge, Andrew	Lambeth, Ont.
Routledge J. Turner	Georgeville, Que.
Rowand James	Dumblane, Ont.
Rowat, J. S.	Simcoe, Ont.
Rusnell, D. H.	Stouffville, Ont.
Russell, J. & W.	Richmond Hill, Ont.
Russell & Sons, Thomas	Exeter, Ont.
Ruston & Son, F.	Sebringville, Ont.
Rutherford, Joseph	Boice, N.Y., U.S.
Rutherford, William	South Monaghan, Ont.
Ryan, W.	Ninga, Man.
Sadler, John	Columbus, Ont.
Salkeld, John L.	Dongola, Assa.
Sangster, R. R.	Lancaster, Ont.
Scarlett, H. H	Florence, Ont.
Scott, F. W.	Highgate, Ont.
Scott, John	Ivan, Ont.
Scott, Robert	Neepawa, Man.
Scott, Thomas	Sutton West, Ont.
Scott, R. H.	Wartburg, Ont.
Secord, James R. R.	Homer, Ont.
Sedgworth, R. & E.	Monck, Ont.
Seip, F.	Miami, Man.
Semple, James	Hereward, Ont.
Service, W. H.	Stayner, Ont.
Shand, C. H. & J.	Port Dover, Ont.
Shanks, James W.	Rapid City, Man.
Shantz, Solomon	Haysville, Ont.
Shantz, T. S.	Waterloo, Ont.
Shantz, Val.	Haysville, Ont.
Sharman & Sharman	Souris, Man.
Sharpe, J. & W.	Lacombe, Alta.
Shattuck, W. D.	Davisburg, Alta.
Shaver, A. M.	Ancaster, Ont.
Shaver, Frederick	Little Britain, Ont.
Shaw, A. J. C.	Thamesville, Ont.
Shaw, Henry	Colinville, Ont.
Shaw, R S	Woodburn, Ont.
Shibley, James E.	Harrowsmith, Ont.
Shier, William	Sunderland, Ont.
Shore Bros.	White Oak, Ont.
Short, Hugh	Oustic, Ont.
Sibbald, M.D., F. C.	Sutton West, Ont.
Silver, John R	Danville, Que.
Simmons, C. M.	Ivan, Ont.
Simpson, Jos.	Ridgetown, Ont.
Sims, H. H.	Thamesford, Ont.
Sinclair Bros.	Kippen, Ont.
Skeoch, James	Corunna, Ont.
Skilliter, T. A.	Grenfell, Assa.
Skinner, Thomas	Katepwe, Assa.
Smith, A. C.	Hagersville, Ont.
Smith, Amos	Trowbridge, Ont.
Smith, A. W.	Maple Lodge, Ont.
Smith, David, & Son	Belmont, Ont.
Smith, D. J.	Murray, Que.
Smith, Geo.	Chatham, Ont.
Smith, Henry	Russell, Man.
Smith, H.	Hay, Ont.
Smith, James.	Inglis Falls, Ont.
Smith & Son, John	Duntroon, Ont.
Smith, John E.	Brandon, Man.
Smith, T. R.	Romney, Ont.
Smith, W. H.	Meaford, Ont.
Smith, William.	Columbus, Ont.
Smyth, Henry R.	Chatham, Ont.
Smyth, Jos. M.	Chatham, Ont.
Snary & Sons	Bilton, Ont.
Snary, Henry	Croton, Ont.
Snell, James	Clinton, Ont.
Snider, Jacob S.	Bloomingdale, Ont.
Snyder, Isaac	Acton, Ont.
Sockett, John	Rockwood, Ont.
Somerville, R.	Elder's Mills, Ont.
Somerville, J. & A.	Elder's Mills, Ont.
Somerville, William	Montefiore, Man.
Sparham, G. E.	Morpeth, Ont.
Spears, R. G.	Battleford, Sask.
Spears, Thomas	Oak Lake, Man.
Spears, T. J	Williamsford, Ont.
Speers, A. M.	Battleford, Sask.
Squire, Samuel W	Owen Sound, Ont.
Srigley, L	Allandale, Ont.
Srigley, John.	Allandale, Ont.
Stalker, John	Acton, Ont.

LIST OF MEMBERS.—*Concluded.*

Name.	Address.
Stancombe, James	Cartwright, Man.
Staples, George	Lifford, Ont.
Staples, R	Lifford, Ont.
Steele, James	Lochalsh, Ont.
Steele, James T	Hullcar, B.C.
Steen, N. A	Meadowvale, Ont.
Stewart, Neil	Gillie's Hill, Ont.
Stewart, Angus	Westbourne, Man.
Stewart, Peter	Atha, Ont.
Stock, C. H	Waterdown, Ont.
Stock, W. E	Waterdown, Ont.
Stocks & Sons, James	Columbus, Ont.
Stockwell, C. F	Danville, Que.
Stone Etate, F. W	Guelph, Ont.
Stone, R	Udney, Ont.
Storey, Peter	Conn, Ont.
Stover, Samuel	Puce, Ont.
Strobridge, H. L.	Cookshire, Que.
Strothers, William	Grayburn, Assa.
Stutt, John A	Fairmede, Assa.
Sunley, Wm	Everton, Ont.
Sutherland, E	Bennington, Ont.
Sutor, George	Beaverton, Ont.
Sutton, William	Ospringe, Ont.
Swain, W. R.	Valentia, Ont.
Switzer, Joseph A	Norval, Ont.
Talbot, R	Everton, Ont.
Talbot & Sons, P.	Lacombe, Alta.
Taylor, Gilbert	Mildmay. Ont.
Taylor, Joseph	Fairfax, Man.
Taylor, John	Leesboro, Ont.
Taylor, W. H.	Park Hill, Ont.
Telfer, William O.	Telfer, Ont
Thompson, Nathaniel	Orangeville, Ont.
Thompson, R. & W. J.	Spiers, Ont.
Thomson, Andrew	Fergus, Ont.
Thomson, A. R	Stamford, Ont.
Thomson, James	Belton, Ont
Thomson, James	Mildmay, Ont.
Thomson, Purves	Pilot Mound, Man.
Thomson, Robert	St. Marys, Ont.
Thorncroft, R	Lambeth, Ont.
Tindale, R.	Fergus, Ont.
Tink & Sons, E	Columbus, Ont.
Titus, A. A.	Napinka, Man.
Toles, Peter	Mount Bridges, Ont.
Tolton, James	Walkerton, Ont.
Todd, T. R	Hillview, Man.
Trespain, Jno	Strathburn, Ont.
Tuck, Jno	Waterdown, Ont.
Tuck, Jno	Mosboro, Ont.
Tucker, Jno	Arthur, Ont.
Tucker, George	Bosworth, Ont.
Tuft, W	Welland, Ont.
Turnbull, Alex	Cranston, Ont.
Turner, D. S.	Whitevale, Ont.
Turner, Jas.	Calgary, Alta.
Turner, J. H	Bottineau, N. Dak., U.S.
Turner, John A	Millarville, Alta.
Turner, Robert	Millarville, Alta.
Tyrwhitt, Lieut.-Col. R	Bradford, Ont.
Vance, Jos.	New Hamburg, Ont.
Van Nostrand, Est. Jno.	Vandorf, Ont.
Varnum, E. N.	Solina, Ont
Vollick, Jno	Mildmay, Ont.
Waddington, T. B	North Portal, Assa.
Wallace, W. H.	Mount Forest, Ont.
Walters, James L	Macleod, Alta.
Walton, G. M	Alexander, Man.
Wannop, James L	Creeford, Man.
Ward, Edwin	Greenbank, Ont.
Warnica, Angus	Craigvale, Ont.
Warnica, Frederick M	Painswick, Ont.
Warren, John	Acton, Ont.
Washington, J. G.	Ninga. Man.
Watson, A. J.	Castlederg, Ont.
Watson, John H	Snelgrove, Ont.
Watson, W. J.	Bradford, Ont.
Watson, Joseph	Greenbank, Ont.
Watson, Estate of Wm.	Dalesboro' Assa.
Watt, Alexander	Shanty Bay, Ont.
Watt, J. & W. B.	Salem, Ont.
Way, T	Chapman, Ont.
Weatherell, T. M.	Glen Adelaide, Ont.
Weatherston, A.	Everton, Ont.
Webb, James	Ospringe, Ont.
Webber, L. K	Hawksville, Ont.
Webster, H. B.	Fergus, Ont.
Webster, John	Fordyce, Ont.
Weir, J. H.	Crumlin, Ont.
West, George R.	Ridgetown, Ont.
Westover, O. L.	Luton, Ont.
Whethan, John	Kirkwall, Ont.
White, A. T	Pembroke, Ont.
White, James	Leaside Junction, Ont.
White, Robert	Wakopa, Man.
White, W. C.	Calf Mountain, Man.
Whitelaw, A. & W.	Guelph, Ont.
Whitton, Robert	Atha, Ont.
Whitson, John	Atha, Ont.
Widdifield, J. W.	Siloam, Ont.
Wideman, M	St. Jacobs, Ont.
Wilkin, Jas.	Balsam, Ont.
Wilkinson, N.	Birtle, Man.
Wilkinson, Maj.Gen. H.C	Birtle, Man.
Williams, Richard	Craighurst, Ont.
Wilson, C. H	Greenway, Ont.
Wilson, James	Dugald, Man.
Wilson, James	Innisfail, Alta.
Wilson, Jno	Hornby, Ont.
Wilson, J. L.	Gorrie, Ont.
Wilson, R. M.	Marringhurst, Man.
Wilson, William	Brampton, Ont.
Wilson & Sons, John	Green River, Ont.
Winteringham, V.	Brandon, Man.
Wise & Sons, William	Clinton, Ont.
Wood & Anderson	Coulee, Assa.
Wood, Senator Josiah	Sackville, N.B.
Wood, Jos.	Dorchester Stn, Ont.
Wood, Robert	Mount Herbert, P.E.I.
Woodlands, Jos.	Durham, Ont.
Wright, Andrew	St. Eustace, Man.
Wright, Herbert	Guelph, Ont.
Wright, Thos. A.	Blackstock, Ont.
Young, Peter	Red Mountain, Que.
Young, William	Waubuno, Man.
Young, W. M.	Whitby, Ont.
Young, Charles.	Brooksdale, Man
Zehr, Jos. L	Tavistock, Ont.

DOMINION SHORTHORN BREEDERS' ASSOCIATION.

ANNUAL MEETING.

The thirteenth annual meeting of the Dominion Shorthorn Breeders' Association was held in Shaftesbury Hall, Toronto, on February 8th, 1899, at 11 a.m.

The following members were present: James Russell, President, Richmond Hill; Hon. John Dryden, Toronto; John I. Hobson, Guelph; Robert Miller, Stouffville; Richard Gibson, Delaware; Arthur Johnston, Greenwood; William Linton, Aurora; C. A. Archibald, Truro, N.S.; W. J. Biggins, Clinton; David Rae, Fergus; Jas Tolton, Walkerton; Wm. Dawson, Vittoria; John Davidson, Ashburn, Henry Cargill, Cargill; Alex. Smith, Maple Lodge; W. G. Pettit, Freeman; C. M. Simmons, Ivan; Edward Jeffs, Bond Head; H. Smith, Hay; Capt. T. E Robson, Ilderton; F. I. Patten, M.D., St. George; Jas. M. Gardhouse, Highfield; C. J. Davis, Freeman; Wm. Dredge, Nassagaweya; W. Bright, Raglan; J. H. Watson, Snellgrove; W. H. Easterbrook, Freeman; Geo. H. Johnston, Balsam; D. H. Rusnell, Stouffville; Geo. Raikes, Barrie; John Gardhouse, Highfield; J. T. Gibson, Denfield; Jos. Bell, Bradford; John Kelly, Shakespeare; R. Duff, Avon Bank; Samuel Allin, Bowmanville; J. C. Hanley, Read; R. Williams, Craighurst; H. Wright, Guelph; R. Gallagher, Perin; T. W. Douglas, Strathroy; J. Mitchell, Fingerboard; W. R. Elliott, Hespeler; R Brown, Orono; Angus Warnica, Craigvale; Dr. Andrew Smith, Toronto; J. C Snell, London; S. J. Pearson, Meadowvale; Fred M. Warnica, Painswick; Alex. Moore, Greenwood; Jas. Bray, Portage la Prairie, Man.; W. H. Smith, Meaford; C. S. Gardhouse, Humber; W. M. Smith, Fairfield Plains; J. D. Gibson, Denfield; F. W. Hodson, Toronto; R. Duff, Myrtle; J. V. Cooper, Picton; G. W. Clemons, St. George; and Henry Wade, Secretary.

PRESIDENT'S ADDRESS.

I am granted the privilege to welcome you to the thirteenth annual meeting of the Dominion Shorthorn Breeders' Association. The past year has been the most successful one in the history of the Association. There have been two hundred and fifty new members added to the membership roll, and upwards of $2,000 added to our credit in the bank, which gives us a grand surplus to-day of $9,000 in the bank. This is very different to olden days when we had to struggle for an existence, and when we had not as many hundreds as we have thousands at present. At the same time, I do not think it is right to throw this money away too lavishly. I am a little afraid the movement is in that direction; but my idea is to keep hold of it and get value for it as we go.

The Prince Edward Island business has been satisfactorily settled. It caused a great deal of work to your Secretary, and a considerble amount of money was spent, but they are bringing in a great many pedigrees now to be registered. Increased numbers have come in both from Nova Scotia and New Brunswick.

I suppose the intention of the Association this year is to vote a pretty heavy grant to the Toronto Industrial prize list for Shorthorns, providing they increase their present prize list substantially. If they do not, we are not bound to give the grant to Toronto. The intention, I believe, is to grant $750, and with their $767 we would like two or three hundred more, or as much as possible. The idea is to have one large central Exhibition of Shorthorns to attract the attention of the American cattle breeders—make one place the grand central point for first-class Shorthorns—and there is no doubt there is no place more suitable for raising such stock than Ontario. We have a climate, soil and water

superior, I believe, to any other part of the continent, and it lies with us to try and make use of it and keep up the reputation the breeders of Ontario have had in producing the very best pure bred stock.

The Secretary was then called upon to read the minutes of the last meeting, but as they were all in the Government Report it was, moved by JOHN I. HOBSON, seconded by Capt. T. E. ROBSON, "That the minutes be taken as read." Carried.

The Secretary's Annual Report was then presented, and it was moved by W. J. BIGGINS, seconded by ALEX. SMITH, "That the report be adopted." Carried.

REPORT OF THE SECRETARY AND EXECUTIVE COMMITTEE.

TORONTO, February 8th, 1899.

The Executive Committee beg to present the thirteenth annual report of the affairs of this Association as furnished by the secretary for the year ending 31st December, 1898.

REGISTRATIONS.

In 1898 we were paid for 5,386 registrations, 5,555 certificates, 1,064 changes of ownership; against, in 1897, 4,128 registrations, 4,246 certificates, and 620 changes of ownership; against, in 1896, 2,957 registrations, 3,017 certificates, and 379 changes of ownership; against, in 1895, 3,000 registrations, 3,100 certificates, and 459 changes of ownership; and against, in 1894, 3,045 registrations, 3,142 certificates, and 493 transfers; and against, in 1893, 3,484 registrations, 3,142 certificates, and 587 transfers.

REGISTRATION FEES.

Following up the change in registrations, as a matter of course there is a corresponding change in registration fees. In 1891 we received $3,152.50; in 1892, $3,835.25; in 1893, $3,787.45; in 1894, $3,357.75; in 1895, $3,222.00; in 1896, $2,954 00; in 1897, $4,124.25; in 1898, $5,233.00, an increase of $1,108.75 over 1897.

HERD BOOKS.

Vol. I.—There were sent out in 1887, 550 volumes; in 1888, 51 volumes; in 1889, 33 volumes; in 1890, 19 volumes; in 1891, 21 volumes; in 1892, 27 volumes; in 1893, 18 volumes; in 1894, 20 volumes; in 1895, 1 volume, also 161 volumes burnt; in 1896, 3 volumes; in 1897, 2 volumes; and in 1898, 3 volumes, leaving on hand 91 volumes.

Vol. II.—There were sent out in 1888, 451 volumes; in 1889, 39 volumes; in 1890, 26 volumes; in 1891, 16 volumes; in 1892, 20 volumes; in 1893, 14 volumes; in 1894, 16 volumes; in 1895, 2 volumes, also 118 volumes burnt; in 1896, 6 volumes; and in 1897, 5 volumes; and in 1898, 8 volumes, leaving on hand 279 volumes.

Vol. III.—There were sent out in 1888, 226 volumes; in 1889, 189 volumes; in 1890, 46 volumes; in 1891, 16 volumes; in 1892, 19 volumes; in 1893, 10 volumes, in 1894, 17 volumes; in 1895, 4 volumes, also 74 volumes burnt; in 1896, 4 volumes; in 1897, 7 volumes; and in 1898, 10 volumes, leaving on hand 378 volumes.

Vol. IV.—There were sent out in 1889, 302 volumes; in 1890, 105 volumes; in 1891, 29 volumes; in 1892, 21 volumes; in 1893, 5 volumes; in 1894, 13 volumes; in 1895, 4 volumes, also 142 volumes burnt; in 1896, 9 volumes; in 1897, 8 volumes; in and in 1898, 14 volumes, leaving on hand 378 volumes.

Vol. V.—There were sent to members in 1890, 134 volumes; in 1891, 130 volumes; in 1892, 78 volumes; in 1893, 39 volumes; in 1894, 33 volumes; in 1895, 9 volumes, also 206 volumes burnt; in 1896, 14 volumes; in 1897, 10 volumes; and in 1898, 18 volumes, leaving on hand 329 volumes.

Vol VI.—There were sent out in 1891, 345 volumes; in 1892, 29 volumes; in 1893, 32 volumes; in 1894, 29 volumes; in 1895, 9 volumes, also 165 volumes burnt; in 1896, 18 volumes; in 1897, 23 volumes; and in 1898, 33 volumes, leaving on hand 315 volumes.

Vol. VII.—There were sent out in 1892, 318 volumes; in 1893, 28 volumes; in 1894, 33 volumes; in 1895, 17 volumes, also 241 volumes burnt; in 1896, 24 volumes; in 1897, 27 volumes; and in 1898, 40 volumes, leaving on hand 272 volumes.

Vol. VIII.—There were sent out in 1893, 304 volumes; in 1894, 38 volumes; in 1895, 25 volumes, also 358 volumes burnt; in 1896, 40 volumes; in 1897, 46 volumes; and in 1898, 51 volumes, leaving on hand 138 volumes.

Vol. IX.—There were sent out in 1894, 269 volumes; in 1895, 46 volumes, also 312 volumes burnt; in 1896, 45 volumes; in 1897, 57 volumes; and in 1898, 58 volumes, leaving on hand 233 volumes.

Vol. X.—There were sent out in 1895, 317 volumes, also 40 volumes burnt; in 1896, 68 volumes; in 1897, 59 volumes; and in 1898, 71 volumes, leaving on hand 442 volumes.

Vol. XI.—There were sent out in 1896, 249 volumes; in 1897, 83 volumes; and in 1898, 75 volumes, leaving on hand 593 volumes.

Vol. XII.—There were sent out in 1896, 148 volumes; in 1897, 122 volumes; and in 1898, 120 volumes, leaving on hand 610 volumes.

Vol. XIII.—There were sent out in 1897, 149 volumes; and in 1898, 171 volumes, leaving on hand 680 volumes.

Vol. XIV. has been published and 151 volumes sent out, leaving on hand 849 volumes.

Vol. XV. has been completed and will contain all the pedigrees recorded in 1898, and, as in volume VII. and subsequent volumes, each pedigree can be traced in its entirety by referring to the pedigree of another animal in the same volume, making the volume complete in itself. In this volume the cows are printed under the name of each owner. This plan debars us from numbering the females at the time of recording. It will be sent out when printed.

PEDIGREES ON RECORD.

Volume I. contains	3,304
" II. "	4,427
" III. "	4,593
" IV. "	4,957
" V. "	4,388
" VI. "	5 904
" VII. "	4,954
" VIII. "	4,024
" IX. "	3,633
" X. "	3,669
" XI. "	3,213
" XII. "	3,148
" XIII. "	2,714
" XIV. "	4,147
" XV. will contain about	5,000
	62,071

As shown by the above table, we are now recording for the sixteenth volume, which will contain animals recorded in 1899.

NUMBER OF MEMBERS FROM INCEPTION TO DATE

	New.	Resigned and lapsed.	Not paid.	Paid.	Total paid.
B.A., 1882	164	..	..	164	164
" 1883	73	..	..	164	237
" 1884	42	..	..	173	215
" 1885	39	.	..	187	220
Dom. S. H. B. Asso., 1886	215	37	8	195	410
" " 1887	80	54	81	357	437
" " 1888	46	79	69	388	434
" " 1889	36	37	91	398	434
" " 1890	29	33	74	405	434
" " 1891	32	67	59	365	397
" " 1892	60	22	47	398	458
" " 1893	49	38	72	349	398
" " 1894	66	72	88	318	384
" " 1895	60	..	..	290	350
" " 1896	109	41	77	315	424
" " 1897	106	36	50	431	537
" " 1898	250	24	48	463	713

This table shows that our paid-up membership roll has increased 236 in the last year in total numbers Our income from members' fees for 1896 was $1,289; for 1897, $1,615; for 1898, $1,536, with a difference of $1.00 on each membership fee.

OFFICE WORK.

This, with the increase of registrations, has been very much augmented; many more letters and cards have been sent out. Volume XIV. was printed and sent out early in October. Thirty-three pedigrees of bulls and about as many cows, that should have been in volume XI., are in volume XIV., and there are missing ones yet to come.

The XV. volume was closed on the 31st of December last. It contains the pedigrees recorded in 1898. We are now taking entries for the XVI. volume.

As a result of the visit of the delegation to the Maritime Provinces last year, we have now obtained the right and title of the Prince Edward Island Short-Horn Herd Book, and have also obtained many more registrations from Nova Scotia and New Brunswick than formerly. The liberal offer to record the ancestors for the term of twelve months free, has resulted in a great many breeders sending in their pedigrees to record, with the expectation of continuing to record in our book. It will not be necessary to suspend the penalty fees any longer; and we may hope for an increased membership from the Provinces down by the sea.

The awarding of premiums at different Provincial Exhibitions was largely increased during the past year, and the sum of $745 has been scattered amongst the worthy and successful breeders of Short Horns all over the Dominion.

At the last annual meeting the annual fees were reduced to $2.00 per annum, which has resulted in a very large increase in membership, consequently circulating more of the Herd Books amongst the breeders. The penalty fees have also been reduced to members, from $1.75 to $1.00, and for non-members from $2.25 to $1.75. The time limit was changed, in 1897, to two years instead of eighteen months.

A list of errors is made in each volume, which should be marked in red ink in the volume mentioned. We also hope breeders will furnish us with any catalogues of sales that may be made during the year.

Your committee would call particular attention to the rule requiring all calves born after the first of January, 1889, to be recorded before they are twenty-four months old. A penalty fee will be charged after that date. Attention is also called to the clause in the constitution which requires that "a member must pay up all his fees in arrears before he can resign;" and to another clause, "that when books and documents are mailed, properly prepaid, the duties of the Association are fulfilled, and should a volume or pedigree be lost in the mail, duplicate copies will have to be paid for."

Extracts from By laws.

Section 1.—Persons desirous of becoming members shall so notify the secretary, pay the entrance fee, and agree, if elected, to conform to the rules of the Association, and not to withdraw without paying all fees due, and giving three months' notice of their intention of doing so.

Section 2.—Members shall pay an entrance fee of $2.00, and subsequently an annual subscription of $2.00, which annual subscription shall be due and payable on the first of January of each year.

Section 5.—Members must keep the secretary advised of their post-office address, and all communications shall be considered as delivered which have been mailed, properly addressed and prepaid.

New by law.—That all calves dropped after January 1st, 1889, shall in future be registered within twenty four months of birth, and if not so registered, enlarged fees shall be charged for their registration.

Section 15.—Fees.—Charges for registration will be:

To members, registration and certificate	$0 75	for each animal.
To non-members, registration and certificate	1 25	" "
Over age, to members (in all cases a certificate goes with registration	1 00	" "
Over age, to non members (in all cases a certificate goes with registration)	1 75	" "

Change of ownership, 25c.; duplicate certificate, 25c.
Back volumes of herd books, $2 00 each.

Henry Wade, Secretary.
Parliament Buildings, Toronto.

FINANCIAL STATEMENT.

Receipts.

1898.		
Jan. 1.	Cash on hand	$6,731 18
Dec. 31.	463 yearly subscribers	926 00
	250 new subscribers	580 00
	Registration fees, 5,386 pedigrees	5,233 00
	Interest on deposit	241 77
	Herd books	64 00
		$13,805 95

Expenditure.

1898.		
Dec. 31.	By rent of hall and insurance	$69 00
	Printing and stationery	256 73
	Postage	336 76
	Auditor and stenographer	62 50
	P. E. Island book	150 00
	Herd books, binding	100 50
	Herd books, Vol. XIV	1,586 22
	Prizes at different shows	745 00
	Commission and committee exp	2,321 20
	Cash on hand	8,178 04
		$13,805 95

FINANCIAL STATEMENT.

Assets.		*Liabilities.*	
1898.		1898.	
Dec. 31. To Cash	$8,178 04	Dec. 31. By balance	$16,663 04
Office furniture, books, etc	150 00		
Vol. I. D. H. B., 91 copies.	136 50		
" II. " 279 "	418 50		
" III. " 378 "	567 00		
" IV. " 348 "	522 00		
" V. " 329 "	493 50		
" VI. " 315 "	472 50		
" VII. " 272 "	408 00		
" VIII. " 138 "	207 00		
" IX. " 233 "	349 50		
" X. " 422 "	663 00		
" XI. " 593 "	889 50		
" XII. " 610 "	915 00		
" XIII. " 680 "	1,020 00		
" XIV. " 849 "	1,273 50		
	$16,663 04		$16,663 04

I hereby certify that I have examined the books and accounts of the Dominion Short-Horn Breeders' Association for the year ending December 31st, 1898, and that the above statement is in accordance with the same.

CHAS. F. COMPLIN,
Auditor.

TORONTO, January 19th, 1899.

ADDRESS BY HON. JOHN DRYDEN.

I would like very much to congratulate the Association on the position we have now attained. I remember in the days gone by when we were struggling for an existence, and had no deposit in the bank, but it was generally the other way—we did not know exactly how we were going to make our payments. Now you have become rich, and presently, like every other affluent concern, you will become proud. I hope, however, that will not be the case. I am very glad to observe that the Committee having the matter in charge has adopted the plan of reducing it to some extent for the purpose of bringing the attention of the public more and more to Shorthorn cattle in Canada. I see you spent a considerable sum last year in giving prizes for this purpose at the various exhibitions. I think that is a wise and proper course, and ought to be continued.

Now, what I specially want to draw the attention of the Association to is another matter entirely different. Most of you know that gentlemen coming from the United States to purchase stock in this country are considerably handicapped, for the reason that they cannot pass the customs unless their animals are first registered in the American book. A great many people coming over here do not know about these regulations, and assume that our certificates will pass them over the lines, but they have to be detained, and they are embarrassed, and annoyed and perplexed about it. We think it is possible it might be changed, especially as the standard of our book here is quite as high as the American—in fact it is the same. This arrangement of accepting our certificates by the American Association was made some years ago. Now why our certificates of registration are not accepted at the lines none of us are able to explain, unless the Washington Department is. I never could find anyone on the other side who could explain it.

In desiring to remove this difficulty as far as we can, the matter was brought up the other day in the Executive Committee meeting of the Shropshire Association. We have some difficulty there. Here is an Association that is an international affair, and yet the authorities will not accept their own certificates. You have to prepare a special export certificate, which is a great annoyance and a great trouble—so we have the sympathy of this Association—and a resolution was passed stating what I have been stating to you in order to try and get the Washington authorities to remove this difficulty, Now, I am willing to do what I can in this matter, if the Associations will clothe me with some authority, or give me some opinions properly expressed, in order that I can go to Washington and make a proper presentation to the authorities there of your needs; but this must be authorized by you. I, therefore, drew up this morning the following resolution :

"Whereas this Association has learned that purchasers of Shorthorn cattle for exportation to the United States are put to much inconvenience and delay in shipment because of the necessity, under present regulations, of registering in the American Herd Book in order to pass the customs;

"Therefore, resolved that, inasmuch as the standard of the Dominion Shorthorn Association is precisely the same as that of the American Record, and that such cattle to be useful in the United States must, in the end, be recorded there, this meeting is of opinion that every interest would be subserved and properly protected by admitting Shorthorns on presentation to the Customs authorities of properly accepted certificates of registration signed by the Registrar under the control of the Department of Agriculture of Ontario.

"Resolved further: that a Committee be hereby appointed to enlist the co operation of the American Shorthorn Association in presenting this view to the proper authorities at Washington."

I may say further, we have made some effort to get the influence of the American Shorthorn Association. They had an Executive meeting a while ago, and the matter was presented. I wrote a letter myself which was presented, and I think some other gentleman, but the Executive Committee, apparently, did not desire to shoulder it, and they simply passed memoranda of the responsibility and suggesting a full meeting of their Board. I understand this board does not meet until November next; but, in case the matter is not decided before that, it would be proper to clothe some persons here with authority to wait on this board to ask this privilege. Nobody will be hurt, but at present everybody is obstructed, hindered and embarrassed, and all the associations are in the same fix. Now, for instance, it is impossible to bring a Shropshire sheep into the United States without paying duty or getting a special certificate. You cannot get it into the United States without that certificate. It must first be registered in the Shropshire Register of the United States, and even then a special certificate must be prepared. Now, all these regulations are made by some officials who assume to know what is required, and they go altogether beyond what is necessary. I think I have said enough to make the view I have taken plain, and shall be very glad if this Association will help us in the matter.

Moved by Richard Gibson, seconded by John I. Hobson, "That the resolution as drawn up by Mr. Dryden be adopted." Carried unanimously.

Moved by C. M. Simmons, seconded by Capt. T. E. Robson, "That Hon. John Dryden, John I. Hobson, Richard Gibson, Arthur Johnston and H. Wade be a commietee to act on the resolution just read." Carried.

Mr. Arthur Johnston said the way affairs were at present it caused a great delay, a great loss and great inconvenience to parties taking cattle over to the United States, and he was pleased this step had been taken.

RESOLUTION *RE* SIGNATURE OF BREEDER ON FORMS.

Moved by RICHARD GIBSON, seconded by WM. DAWSON, "That all pedigrees sent for record must be signed by the breeder, or, in case of death, by a proper representative; the breeder of an animal being the owner at the time of service." Carried.

Just before this resolution was carried the following expressions of opinion were given:

Mr. WADE explained that they required all applications in the United States to be signed by the breeder, and in order to avoid any complaint that might arise on account of our applications not being at all times signed by the breeder, thought it wise to adopt the American plan.

Mr. ARTHUR JOHNSTON: I heartily approve of the resolution. The regulations of the Americans are very strict in that matter, and if they find any discrepancy between our mode of entry and their mode of entry it would be a very good argument against accepting our pedigrees.

Mr. HOBSON: I think, Mr. Chairman, it is quite right. I know in my own case men write me and visit me, asking me to tell them the number of a bull sold probably ten years ago, and that same thing is going on all over the country, and depend upon it, if the owner is left to sign these applications there are a certain number of mistakes made. We cannot be too careful when we are asking our animals should be admitted across the lines on our certificates. Do I understand by that, if you buy a cow that was served, and a transfer slip is given along with it with the service time entered on it you have to send the pedigree of the calf back to the breeder to be signed?

Mr. WADE said in a case like that if the transfer slip was properly signed by the owner of the service bull and the breeder, at the time of service, the signature of the owner of the calf, he thought, would be sufficient.

Mr. DRYDEN: My judgment is, you ought to have both breeder and owner sign For instance, I sell a female to a man in the United States; she is served by my bull, the calf is dropped in due course. I know nothing about it. I have never seen it. It is open for this man to play a little game with the application I sign as breeder as he may be fastening that to some other animal. If you want to be safe you ought to have the signature of both these men.

It was the general opinion of the meeting that in a case like this it should be left to the Secretary to get full details and all signatures necessary.

A short discussion then took place as to who was the breeder, the man who owns the cow at the time she gives birth, or the man who owns her when she is served, the former being endorsed by the English breeders and the latter by the American breeders. It was decided to adopt the American plan, that is, the man who owns the dam at the time of service is the breeder of the calf.

RICHARD GIBSON: I move that $500 be appropriated to the Winnipeg Exhibition to be given in prizes for short horn cattle, and that the dividing of the prize money for different classes be left in the hands of the Executive Committee. Seconded by ARTHUR JOHNSTON, and carried.

Mr. GIBSON: You have $9,000 in the bank. What good will that do you? Get this money out where it will do some good to the Shorthorn interests. I tell you, gentlemen we would make a great mistake if we did not vote to Winnipeg Exhibition this year. There is our great market, and there is where the people are going to come from to buy our Shorthorns in Ontario if they know there is a good Show with large prizes in Winnipeg. They are not afraid to spend the money to get a good animal.

RESOLUTIONS.

Following are resolutions as drawn up at the Directors' meeting and confirmed at the annual meeting.

Moved by Dr. PATTEN, seconded by C. M. SIMMONS, "That in addition to the sum already voted for prizes $800 be put into the hands of the Executive Committee to dispose of as they deem fit for Shorthorn premiums at the different large Exhibitions in the Dominion." Carried.

Moved by H. SMITH, seconded by Dr. PATTEN, "That we set aside the sum of $750 from the funds of the Association, to be given in premiums for Shorthorns at one of the leading Exhibitions in Ontario, and that the said sum be placed in the hands of the Executive Committee to be granted to either London or Toronto, wherever the best arrangements can be made in supplementing this grant." Carried.

Moved by Dr PATTEN, seconded by JAS. TOLTON: "That a rider be placed on the motion of the $500 voted to Winnipeg, that it be placed in the hands of the Executive Committee to give to Winnipeg, providing they supplement it by an amount deemed sufficient." Carried.

SUGGESTIONS *RE* PRIZES.

Mr. SIMMONS: My views would be to ask the Toronto people to offer four prizes in every section, from the very first, and when you get down to where great numbers are shown in one section have six or eight prizes. If you have just three, one or two men will go home with the whole of it. This money is to draw a number of exhibitors there, and if a number of prizes are given in each section it will bring more out.

Mr. HODSON: I think it would be wise to leave everything in the hands of the Executive. I quite agree with Mr Hobson, but I think it is the opinion of the members that my suggestions should be carried out.

Mr. GIBSON: I think it has been suggested to leave it in the hands of the Executive Committee. At the same time I think the Executive should be open to any suggestions the meeting like to offer them I remember at one time judging in Toronto fifty-six Shorthorn bulls, and five of them were nearly the same, so in a case like that they were each entitled to a prize, and if a prize or two more had been given this could have been done. I want to make this suggestion: Have the prizes increased in two-year-olds and yearling classes in females. They are the most important classes we have. Do not give so much to the old cows.

Mr. H. SMITH: I would make this suggestion: That we give prizes to the best four animals the get of one bull; also to the best two animals the produce of one cow.

JAS RUSSELL: I maintain it ought to be a cow and two of her progeny.

Mr. ARTHUR JOHNSON, in referring to the amount they wished to get from the Toronto Industrial, over and above last year's grant to Shorthorns, said he did not think they would be able to get any more than the extra sum they had proposed to draw from them on giving this $750.

D. H. RUSNELL: I quite agree with Mr. Simmons as to the different number of prizes.

Mr. A. SMITH: I think it ought to be a stimulus to young breeders to come forward when large amounts are offered, although I am not in favor of too many prizes.

CORRESPONDENCE.

A communication was read from the Manager of the "Western Manitoba's Big Fair," Brandon, Man, was received, thanking the Association for their donation of last year, and asking that the Association again donate special prizes at their Fair for 1899.

A communication was read from H. Cargill, M. P., Cargill, stating that he was retiring from the Directory of the Shorthorn Association and, if agreeable to the members of the annual meeting, his son be appointed in his place.

Letters were then read from J. H. Pickrell, Secretary of the American Shorthorn Breeders' Association, the first having been written Dec. 28th, 1896, in which he stated his willingness to co-operate with the Dominion Shorthorn Association in getting their certificates recognized at the lines. The second one of Jan. 21st, 1899, being in answer to communications sent him by Hon. John Dryden, Robert Miller, and Henry Wade, "requesting that the Executive Committee recommend to the authorities at Washington, D.C., to admit Shorthorns imported from Canada into the United States free of duty on presentation of certificate of registration in the Dominion Shorthorn Herd Book," stating that the matter had been referred to the Board of Directors to be considered at their next meeting in November, 1899.

Mr. Pickrell's letters had been sent to Hon. Sydney Fisher, and a rep'y was received from him on Feb. 6th, 1899, saying, that until he got the necessary means to appear before the United States authorities he could do nothing in the way of getting the certificates recognized at the lines.

Also another communication was received from the Hon. Sydney Fisher, of Dec. 28th, 1898, in reply to a resolution sent him by the Association in reference to animals being admitted into Canada from Great Britain without being tested with tuberculin here after having being tested over there. In this latter he expressed his regret at the resolution being passed, and thought it would never have been passed had full information and knowledge of the facts of the cases been known.

DISCUSSION ON TUBERCULOSIS AND TUBERCULIN.

Richard Gibson: Cattle breeding has been, and is one of the industries in which Canadians have excelled; and one of the main sources of wealth to our farmers No country in the world has such a good name as a cattle breeding country, always excepting the mother land, the fountain head for the improved breeds of live stock. We have not now one-tenth part of the first class animals needed to supply the demand in our great Northwest and in the United States. If we do not make every effort to hold our position we will be beaten by some of the Central States, which are now importing for themselves, and which a few years ago, bought from Canadian importers and breeders. Our shipping cattle are not so good now as they were twenty years ago. No ten agencies combined have had so much effect in bringing about this deterioration as the application of the tuberculin test. We may well profit from the experience of the medical profession in this matter. They have quit using tuberculin in the human family, having decided long ago that it hurried the end in many cases and made the subject an easy prey to consumption, whereas under favorable circumstances the disease would have lain dormant or died out. The most eminent specialists agree that in very few cases can tuberculin be used without danger. If this is true in human beings it must also be true with regard to cattle. Herds tested have given proof of this by animals with rugged constitutions suddenly taking ill and dying Other herds have been tested the third time before any reaction took place, when a majority showed great reaction. We believe that the injection of tuberculin is more likely to create disease than to stamp it out. We believe the test is mis-

leading, inasmuch as it condemns cattle practically sound and clear others very much diseased. We know that it hampers our trade in this country, and that it must stop us from importing from England and Scotland, which would be an incalculable injury to the great industry we represent.

Mr. Gibson intended at first to allow this to stand as part of his resolution, when quite a heated discussion took place.

Mr. Hobson: I wish to say that before anybody votes on that resolution it should be very carefully considered. There are many statements made there which have abundant room for criticism. I think it very risky indeed to vote for that motion.

Mr. Gibson: I am very sorry, Mr. Hobson, but the medical profession have not adopted the tuberculin; and as regards cattle in your own town, Hon. John Dryden told me where cattle responded, some had found small tubercules in the glands of the neck visible with the naked eye, and in one cow that was rotten there was no response.

Mr. Hobson: I think it would be a very serious thing if we go on and endorse all the statements in that resolution. I have made a special study of this, and I tested one of the largest herds in Canada myself, and I know the facts are not in accordance with that resolution.

Mr. Robert Miller said he thought there were only one or two definite clauses in the resolution, and the other part was only a matter of opinion. I think it is a most serious thing if that embargo is not removed, as I feel for the people of this country. My father came here over sixty years ago and brought Shorthorns with him then. He has lived with Shorthorns I have been brought up in the same line, and I know nothing else; and if this embargo is not taken away we must remove our grounds of operation to the United States. I was born a British subject. I was born and brought up not far from here. This is not altogether a matter of sentiment, but I cannot help but feel it is too bad if one man should have autocratic power, and just through his opinion, not always carefully and wisely given, we should have to go out of the country, and perhaps go out, to a certain extent, with disgrace.

Mr. Arthur Johnston said that there was not one morsel of doubt that this embargo was ringing the death knell to the importation of cattle to this country, and it was due to a great extent to the autocratic power of one gentleman.

Dr. Patten: If I had a herd and knew it to be perfectly sound I would not for thirty thousand dollars allow the tuberculin test to be made.

Mr. Hobson said if Mr. Gibson would deal with the upper part of the resolution he would vote for it, but to go into questions of detail it would be unwise.

It was then finally moved by Richard Gibson, seconded by William Linton, "That we, the Shorthorn Breeders' of Canada, assembled in our annual meeting, do hereby ask the Dominion Government to allow cattle to come into Canada from Great Britain without being tested for tuberculosis." Carried.

Moved by Arthur Johnston, seconded by Richard Gibson, "That the same regulations be extended to cattle imported from the United States, providing they reciprocate and allow our cattle to go into the United States." Carried.

A short discussion took place as to reducing the Herd Book from $2 to $1.50, back volumes, but no action was taken.

Mr. J. C. Hanley, of Read, then read a paper on Shorthorns.

Moved by John I. Hobson, seconded by Robert Miller, "That Mr. Hanley be tendered the thanks of this meeting for his able paper." Carried.

The meeting then adjourned.

PRIZE-WINNING SHORTHORNS AT THE TORONTO INDUSTRIAL, 1898.

Bull, 4 years old and upwards.

1st. Moneyfuffel Lad=20521= ; roan ; calved December, 1893. Bred by J. & W. Russell, Richmond Hill, Ont.; sire, Topman=17847= ; dam Isabella 14th=13944. Exhibitor, T. E. Robson, Ilderton, Ont.

2nd. Indian Brave=21500= ; roan; calved January, 1894. Bred by David Birrell, Greenwood, Ont.; sire, Indian Chief (imp.) =11108 = ; dam, Crimson Gem = 15916 =. Exhibitor, R. & S. Nicholson, Sylvan, Ont.

3rd. Canada=19586= ; roan ; calved February, 1893. Bred by J. & W. B. Watt, Salem, Ont.; sire, Clan Stewart=14381= ; dam, Bonny Jean=16593=. Exhibitor, Wm. Shire, Sunderland, Ont.

Bull, 3 years old and under 4.

1st. 16th Crown Jewel=21696= ; roan ; calved October, 1894. Bred by R. & S. Nicholson, Sylvan, Ont.; sire, Norseman = 16597 = ; dam, Leonore of Elmdale 3rd = 12252=. Exhibitors, Eastwood Bros., Mimico, Ont.

2nd. New Year's Gift=22254= ; red ; calved January, 1895. Bred by exhibitors ; sire, Rantin Robin (imp.)=18958= ; dam, Bracelet 7th=22604=. Exhibitors, Thos. Russell & Son, Exeter, Ont.

3rd. Lord Stanley 4th=22678= ; roan ; calved October, 1894. Bred by J. & W. Russell, Richmond Hill, Ont.; sire, Lord Stanley=17849= ; dam, Nonpariel Victoria=17139=. Exhibitor, Geo. Gier, Grand Valley, Ont.

Bull, 2 years old and under 3.

1st. Sittyton Hero=23313= ; red and a little white ; calved September, 1895. Bred by Hon. Jno. Dryden, Brooklin, Ont.; sire, Earl of March=17252= ; dam, Carrie=23453=. Exhibitors, Jas. I. Davidson & Son, Balsam, Ont.

2nd. Riverside Stamp=23589= ; red and white ; calved March, 1896. Bred by Thos. Russell & Son, Exeter, Ont.; sire, Sultan of Riverside=22094 = ; dam, Bracelet 7th=22604=. Exhibitors, J. & W. B. Watt, Salem, Ont.

3rd. Lord Willison=24315= ; red ; calved October, 1895. Bred by A. Johnston, Greenwood, Ont ; sire, Indian Chief (imp.)=11108= ; dam, Cleta's Gem=21500=. Exhibitors, J. Fried & Sons, Roseville, Ont.

Bull, 1 year old.

1st. Lord Hamilton=25208= ; red ; calved September, 1896. Bred by W. C. Edwards & Co , Rockland, Ont.; sire, Scottish Knight=21333 ; dam, Madge Hamilton = 23485 =. Exhibitor, Jas. Rennie, Wick, Ont.

Bull Calf, under 1 year.

1st. Royal Standard=27653= ; roan ; calved September, 1897. Bred by exhibitors ; sire, Judge—23419= ; dam, Lady Aberdeen (Vol. XV). Exhibitors, J. & W. B. Watt, Salem, Ont.

2nd. Golden Flame=27770= ; roan ; calved October, 1897. Bred by exhibitors ; sire, Goldust=23359= dam, Gipsy Maid=29819=. Exhibitors, Goodfellow Bros., Macville, Ont.

3rd. Bismarck=27695= ; red ; calved November, 1897. Bred by exhibitor ; sire, Abbotsford=19446= ; dam, Barberry=24539=. Exhibitor, H. Smith, Hay, Ont.

4th. Sittleton Hero 2nd=27645= ; red ; calved September, 1897. Bred by exhibitors ; sire, Sittleton Hero=23313= ; dam, 34th Duchess of Glo'ster= ; 23367. Exhibitors, Jas. I. Davidson & Son, Balsam, Ont.

5th. Royal Banner=27652=; roan; calved October, 1897. Bred by exhibitors ; sire, Judge=23419=; dam English Lady 11th=31062=. Exhibitors, J. & W. B. Watt, Salem, Ont.

Bull Calf, calved after February 1st, 1898, given by Dominion Shorthorn Breeders' Association.

1st. 23rd Crown Jewel=27586= ; red ; calved February 7th, 1898. Bred by exhibitors ; sire, Indian Brave=21500= ; dam, 6th Leonore of Sylvan =25804=. Exhibitors, R. & S. Nicholson, Sylvan, Ont.

Bull, of any age.

1st. Moneyfuffel Lad=20521=. Exhibitor, T. E. Robson, Ilderton, Ont.

Cow, 4 years old and upwards.

1st. Louan of Browndale 2nd (Vol. XV) ; red ; calved October, 1889. Bred by H. F. Brown, Minneapolis, Minn., U.S.; sire, Bloom's Duke of South Fork=27690 = ; dam, 3rd Louan of Kinnickinnie (Vol XV). Exhibitor, T. E. Robson, Ilderton, Ont.

2nd. Matchless 11th=22939= ; red and white ; calved October, 1890. Bred by exhibitors ; sire, Brampton Hero=324= ; dam, Matchless of Elmhurst 2nd=3883=. Exhibitor, J. & W. B. Watt, Salem, Ont.

3rd. Medora 12th=22606= ; dark roan ; calved March, 1892. Bred by exhibitors ; sire, Sultan Selim (imp.)=4129=; dam, Medora 8th (imp.)=5174=. Exhibitors, T. Russell & Son, Exeter, Ont.

COW, 3 YEARS OLD.

1st. Mysie's Rose=28852=; white; calved April, 1895. Bred by exhibitor; sire, Royal Chief=19269=; dam, Mysie's Gem=17046=. Exhibitor, T. E. Robson, Ilderton, Ont.

2nd. 9th Leonore of Sylvan=27358=; red; calved September, 1894. Bred by exhibitors; sire, Norseman =19398=; dam, 12th Leonore of Elmdale=20245=. Exhibitors, R. & S. Nicholson, Sylvan, Ont.

3rd. Bracelet 8th (Vol. XV); red; calved January, 1895. Bred by exhibitors; sire, Rantin Robin (imp.) =18958=; dam, Bracelet 2nd=24239=. Exhibitors, T. Russell & Son, Exeter, Ont.

HEIFER, 2 YEARS OLD.

1st. Mildred 6th=31068=; roan; calved December, 1895. Bred by exhibitors; sire, Royal Sailor imp.) =18959=; dam, Mildred 5th=31067=. Exhibitors, J. & W. B. Watt, Salem, Ont.

2nd. Matchless 18th=29130=; red; calved October; 1895. Bred by exhibitors; sire, Royal Sailor (imp.) =18959=: dam, Matchless of Elmhurst 9th=17269=. Exhibitors, J. & W. B. Watt, Salem, Ont.

3rd. Rosina 2nd=29536=; roan; calved October, 1895. Bred by J. & P. Crerar, Shakespeare, Ont.; sire, 10th Crown Jewel=16607=; dam, Rosina=29535=. Exhibitor, T. E. Robson, Ilderton, Ont.

HEIFER, 1 YEAR OLD.

1st. Matchless 19th=31066=; roan; calved September, 1896. Bred by exhibitors; sire, Royal Sailor (imp.)=18959=; dam, Matchless of Elmhurst 9th=17269=. Exhibitors, J. & W. B. Watt, Salem, Ont.

2nd. Dora Stamford=31061=; red; calved October, 1896. Bred by exhibitors; sire, Royal Sailor (imp.) =18959=; dam, Miss Stamford=22942=. Exhibitors, J. & W. B. Watt, Salem, Ont.

3rd. Myrtle 6th=30717=; red and white; calved September, 1896. Bred by H. Cargill & Son, Cargill, Ont.; Sire, Royal Member (imp.)=17107=; dam, Myrtle 3rd (imp.)=24834=. Exhibitor, T. E. Robson, Ilderton, Ont.

HEIFER CALF, UNDER 1 YEAR.

1st. Lovely Lorne 2nd =33408=; roan; calved September. 1897. Bred by exhibitor; sire, Golden Robe =20396=; dam, Lovely Lorne=25981=. Exhibitor, T. E. Robson, Ilderton, Ont.

2nd. Village Violet =33633=; dark roan; calved October, 1897. Bred by Exhibitor; sire, Caithness =22065=; dam, Village Maid=14541=. Exhibitor, H. Smith, Hay, Ont.

3rd. Vanity 2nd =33631=; red; calved October, 1897. Bred by exhiibtor; sire, Abbotsford=19446=; dam, Vanity=24551=. Exhibitor, H. Smith, Hay, Ont.

4th. 25th Maid of Sylvan =33174=); roan; calved September, 1897. Bred by exhibitors; sire, Norseman=16397=; dam, 21st Maid of Sylvan=22405=. Exhibitors, R. & S. Nicholson, Sylvan, Ont.

5th. Lady English 6th (Vol. XV); roan; calved December 30th, 1897. Bred by exhibitors: sire, Royal Sailor (imp.)=18959=; dam, Lady English 3rd=21078=. Exhibitors, J. & W. B. Watt, Salem, Ont.

HEIFER CALF, CALVED AFTER JANUARY 1ST, 1898, GIVEN BY DOMINION SHORTHORN BREEDERS' ASSOCIATION

1st. 54th Duchess of Glo'ster =31766=; roan; calved February, 1898. Bred by exhibitors; sire Sittyton Hero=23313=; dam, 46th Duchess of Gloster=25145=. Exhibitors, Jas. I. Davidson & Son, Balsam, Ont.

FOUR CALVES, UNDER 1 YEAR OLD, BRED AND OWNED BY EXHIBITOR.

1st. Exhibitor, H. Smith, Hay, Ont.

2nd. Exhibitor, J. & W. B. Watt, Salem, Ont.

3rd. Exhibitor, Jas. I. Davidson & Son, Balsam, Ont.

HERD OF 1 BULL AND 4 FEMALES, OVER 1 YEAR OLD.

1st. Exhibitor, T. E. Robson, Ilderton, Ont.

2nd. Exhibitor, J. & W. B. Watt, Salem, Ont.

3rd. Exhibitor, Thos. Russell & Son, Exeter, Ont.

HERD OF 1 BULL AND 4 FEMALES, UNDER 2 YEARS OF AGE, OWNED BY EXHIBITOR AND RECORDED IN THE DOMINION SHORTHORN HERD BOOK, GIVEN BY THE DOMINION SHORTHORN BREEDERS' ASSOCIATION.

1st. J. & W. B. Watt, Salem, Ont.

FEMALE, OF ANY AGE.

1st. Mysie's Rose=28852=. Exhibitor, T. E. Robson, Ilderton, Ont.

CANADIAN AYRSHIRE BREEDERS' ASSOCIATION.

OFFICERS FOR 1898.

President: R. NESS, Howick, Que.

1st Vice-President: A. KAINS, Byron, Ont,

Vice-Presidents:

Ontario: J. C. SMITH ..... Hintonburg.
Quebec: W. C. EDWARDS ..... Rockland.
Manitoba: GEO STEEL ..... Glenboro, Man.
Assiniboia: C W. PETERSON ..... Regina, Assa.
British Columbia: —— MACKIE ..... Eburne, B.C.
Prince Edward Island: F. G. BOVYER ..... Georgetown, P.E.I.
Nova Scotia: C. A. ARCHIBALD ..... Truro, N.S.
New Brunswick: M. H. PARLEE ..... Sussex, N.B.

Directors:

ROBERT NESS ..... Howick.
JOHN MORRIN ..... Belle Riviere.
NAP. LACHAPELLE ..... St. Paul l'Hermite.
T P MCCALLUM ..... Danville.
W. F. STEPHEN ..... Trout River.
A. DRUMMOND ..... Petite Cote.
R. HUNTER ..... Maxville.

Executive Committee (Eastern Division): NAP. LACHAPELLE, A. DRUMMOND and R. HUNTER.

Executive Committee (Western Division): WM. STEWART, jr, W. W. BALLANTYNE and JOS. YUILL.

Revising Committee: F. W. HODSON, A. DRUMMOND, JOS YUILL, ROBERT NESS and H. WADE

Auditor (Ontario): C. F. COMPLIN, London.

Auditor (Quebec): A. DRUMMOND, Petite Cote.

Eastern Secretary: J. P. L BERUBE, Montreal.

Secretary-Treasurer: H. WADE Toronto.

Delegates to Industrial Exhibition: W. W. BALLANTYNE, Stratford; WM. STEWART, jr., Menie.

Delegates to Western Fair: A KAINS, Byron; R S BROOKS, Brantford.

Delegates to Ottawa: J. C. SMITH, Hintonburg; JOS. YUILL, Carleton Place.

Judges Recommended.

Toronto Industrial: A. KAINS, Byron; R. PEARS, Mount Morris, N Y.

Ottawa Central: W W. BALLANTYNE, Stratford; A. DRUMMOND, Petite Cote.

London Western: DANIEL DRUMMOND, Petite Cote; J. C. SMITH, Hintonburg.

Quebec Exhibition: A. HUME, Burnbrae, Ont., and THOS. DSYSDALE, Allan's Corners, Que.

Additional List.

T. D. MCCALLUM, Danville; R. HUNTER, Maxville; D BENNING, Williamstown; W. F STEPHEN, Trout River; J. G. CLARKE, Ottawa; A. ROBERTSON, Como; THOS. DRYSDALE, Allan's Corners; JOHN HAY, Lachute; J. H. DOUGLAS, Warkworth.

LIST OF MEMBERS AYRSHIRE BREEDERS' ASSOCIATION.

Name.	Address.
Agricultural School	L'Assomption, Que.
Agricultural School.....	Ste. Anne de la Pocatiere, Que.
Anderson, J. & R.....	Hamilton.
Anderson, Robert.....	Howick, Que.
Archambault, Tascrede.	L'Assomption, Que.
Archibald, C. A.... ...	Truro, N.S.
Bass, W. M	Newboro'.
Baldock, Wm.....	Mount Charles.
Ballantyne, W. W	Stratford.
Baxter, David.... . ..	North Georgetown, Que.
Benham & Son, Jesse...	Sweetburg, Que.
Beaubien, Hon. Louis...	Outremont.
Benning, David..... ...	Williamstown.
Blue, John	Eustis, Que.
Black, Fred. S	Amherst, N.S.
Bond, Hon. Robert	St. Johns, Nfld.
Bourassa, Henri, M.P...	Monte-Bello, Que.
Bonnell, C. E.....	Bobcaygeon.
Bryson, Jas	Allan's Corners, Que.
Brownlee, Wm....	McDonald's Corners.
Brown, Jas. E.....	Grahamsville.
Brooks & Son, T.....	Brantford.
Buchanan, George.....	Cote St. Michel, Que.
Bustard, Geo.	Vicars, Que.
Caldwell Bros	Orchard.
Carruthers, J. B	Kingston.
Campbell, John R.....	Vernon.
Campbell, A.....	Howick, Que.
Charlemagne & Lac Ouareau Lumber Co..	Charlemagne, Que.
Cleland, Arch	Hemingford, Que.
Clow, John.....	Harrowsmith.
Cottingham, Jas.....	Ormstown, Que.
Cowan, Jas.	Allan's Corners, Que.
Crawford Bros.	Brown's Corners.
Crosby, John.	Campbellford.
Cumming, Donald	Lancaster.
Cumming, A. J.	Heckston.
Cunningham, John	Norval.
Davies, Robert.....	Toronto.
Davies, Geo.....	Toronto.
Dawes & Co	Lachine, Que.
Denyes, H. K	Foxboro'.
Deschamps, Louis	St Paul L'Hermite, Que.
Donihee, Patrick	Malone, N.Y., U.S.
Douglas, John H.....	Warkworth.
Drummond, Daniel.....	Petite Cote, Que.
Drummond, Jas..... ..	Petite Cote, Que.
Drysdale, Thos	Allan's Corners, Que.
Dundas & Grandy	Springville.
Dyment, N.....	Clappison's Corners.
Easton, Ed. H.	Lyn.
Edwards & Co., W. C...	Rockland.
Empey, M. N....	Napanee.
Ewing, Wm	Montreal, Que.

Name.	Address.
Eyre, H. E.....	Harlem.
Garth, A. E	Ste. Therese.
Girouard, Elie.....	Ste. Victorie.
Girouard, Hilaire.....	Montreal, Que.
Gibbons, W. T.....	Northcote.
Greenway, Hon. Thos...	Crystal City, Man.
Greenshields, J. N.....	Danville, Que.
Guy, F. T	Bowmanville.
Hamilton, John	Grande Freniere, Que.
Hay, John.....	Lachute, Que.
Hay, Wm	Howick, Que.
Harper, Mrs Wm.....	Elb Mills.
Harrison, R	Avonroy.
Harkness & Son	Irena.
Hendy, Chas	Campbellford.
Henry, Wm	City View.
Hillman, G. M.....	St. Davids.
Hill, Geo.	Delaware.
Hodson, F. W.....	Toronto.
Hume & Co.. A.....	Burnbrae.
Hurley, Dennis.	Vankleek Hill.
Hudson, Jos....	Lyn.
Irving, Thos.....	North Georgetown, Que.
James, J. A.....	Nilestown.
Johnston, D. B.....	Lansdowne.
Johnston, Jas	Montreal, Que.
Jones, Geo. H	Bedford, Que.
Kains, A.....	Byron.
Kennedy, Arch	Vernon.
Klock & Co., R. H.. ...	Klock's Mills.
Kydd, W.....	Petite Cote, Que.
Lachapelle, F. O.....	St. Paul L'Hermite
Lachapelle, Napoleon...	St. Paul L'Hermite.
Lafortune, D. A . ..	St. Laurent, Que.
Lamarche, Horace	St. Esprit, Que.
Lavallee, Paul....	Berthier, Que.
Lawrie, Jas.	Malvern.
Lescharbeau, J. A... ..	St. Stanislas, Que.
Leitch, David	Grant's Corners.
Mackie Bros	Eburne, B.C.
Macfarlane, Jas.....	Kelso, Que.
Macfarlane, Thos.....	Acton, Que.
Maclaren, Arch...	Huntingdon, Que.
Marsh & Son, E..... .	Gladstone.
Mellick, Aaron	Smithville.
Moote & Son, Robt.....	Rosedene.
Morrin, John.	Belle Riviere, Que.
Mousseau, A.	Berthier, Que.
Muir, sr., Arch...	Huntingdon, Que.
Muir, Geo. H.	Montreal, Que.
Murphy, Jeremiah.....	Rockburn, Que.
Murchison, Don	North River, P.E.I.
Murphy, R. G....	Elgin.

LIST OF MEMBERS.—*Continued.*

Name.	Address.	Name.	Address.
McCormack & Son, Jas.	Rockton.	Sangster, R. R.	Lancaster.
McCord, Jas.	Prescott.	Sandilands, John	Summerstown Station.
McCallum, A.	Danville, Que.	Scott, Andrew	Roberval, Que.
McDonald, F. E	Bloomfield.	Shirreffs, J. R	Clarence, Que.
McGibbon, William	Montreal, Que.	Simpson, Jas	Brockville.
McIntyre, W.	Newington.	Smith, J. C.	Hintonburg.
McKee, H. & J.	Norwich.	Smith, W. M.	Fairfield Plains.
McLachlan, Duncan	Petite Cote, Que.	Snyder & Son, J. H.	Attercliffe.
McLennan, D. N.	Summerstown Station.	Sorby, D. & O	Guelph.
McDonald, J. A., jr.	Williamstown.	Stephen, W. F.	Trout River.
		Steel Bros	Glenboro', Man.
Ness, Robert	Howick, Que.	Sterling, T. W.	Kelona, B.C.
Ness, Robert R.	Howick, Que.	Stewart, jr., Wm.	Menie.
Newman, John	Lachine, Que.		
Nichol, Walter	Plattsville, Ont.	Taylor, F. W.	Wellman's Corners.
		Terril, A	Wooler.
Oliver & Son, A	Motherwell.	Thom, Wm.	Lynedoch.
Ouimet, Winfrid	Ste. Rose, Que.	Trudel, T.	St. Prosper, Que.
Owens, Hon. Wm.	Montreal, Que.	Turenne, Delphis	St. Paul L'Hermite, Que.
Parlee, M. H.	Sussex, N.B.	Walker, sr., Thos.	Menie.
Paton, Hugh	Montreal, Que.	Walker, jr., Thos.	Hoard's Station.
Paris, I. T.	Fairfax.	Wells & Son, A. C.	Chilliwack, B.C.
Patton, O. P.	Brome Corner, Que.	Whalen, John H.	Westport.
Peterson, Chas. W.	Regina, Assa.	White Bros.	Perth.
		Whiteside Bros	Innerkip.
Rathbun Co	Deseronto.	Whitney, B	Franklin.
Reford, Robert	Ste. Anne de Bellevue.	Whittacker & Son, H. J.	North Williamsburg.
Richard, Jos.	Ste. Anne de Pocatiere, Que.	Wilson, J. Lockie.	Alexandria.
		Wooley Jos. H.	Simcoe.
Robertson, Alex	Maitland.	Wylie, Wm.	Howick, Que.
Robertson, Robert	Nappan, N.S.		
Robertson, Robert	North Georgetown, Que.	Yates, Mahlon	Athens.
Rivet, Chas.	Joliette, Que.	Yorke, H. W.	Harrietsville.
		Yuill, Jos.	Carleton Place.

AYRSHIRE BREEDERS' ASSOCIATION.

A meeting of the Directors of the Dominion Ayrshire Breeders' Association, was held in the Albion Hotel, Toronto, on Tuesday, the 17th of January, at 2 p.m.

The following Directors were present: W. M. Smith, Fairfield Plains, in the chair; F. W. Hodson, Toronto; W. W. Ballantyne, Stratford; R. S. Brooks, Brantford; William Stewart, Menie; Jos. Yuill, Carleton Place; A. Kains, Byron; J. C. Smith, Hintonburg; Robert Davies, Toronto and H. Wade, Secretary.

The Secretary read the minutes of all the business transacted since amalgamation, also the Constitution and By-laws of the new Canadian Ayrshire Breeders' Association, after which a short discussion took place.

WM. STEWART: If these Ross cows are not eligible for registration how can their progeny be?

Mr WADE: Some of the pedigrees of cattle born at Kingston, that occur in these pedigrees, I have straightened out since amalgamation. In the pedigree of Lady of the Lake, sold to Mr. Fox, a bull called Marquis 2nd, bred by Mr. Denison here in Toronto, was from a Ross cow, but Lady of the Lake descended from cattle bred at Kingston by the Rev. Mr. Allen, and he has certified to the breeding of some of them. I have not recorded any of the descendants of the Ross cows registered, since amalgamation.

Mr. HODSON: The standard has been raised rather than lowered since amalgamation.

J. C. SMITH: What did Mr. Winslow, the American Secretary, say about recognizing these pedigrees, providing we can trace them to imported stock?

Mr. WADE: We will not accept any of these pedigrees unless Mr. Winslow consents also.

Mr. YUILL: The Quebec men met us in a very friendly spirit, as they seemed as anxious to get a high standing as we were. Mr. Yuill also said, in reference to Mr. Jas. McCormack's accusations, in not calling a meeting of the Dominion Association to ratify the work done, that they had talked about calling a meeting, and it was agreed there would be no use in doing so as everything was arranged amicably, and also on account of the expense it would put the Association to.

Mr. HODSON: This matter was threshed out, and it looked like a very big expense to call either a meeting of the Directors or an annual meeting, and it was decided not to do so. I am sure our Secretary has gone to no end of trouble in trying to get everything straightened up. I realized that unless we had a single Ayrshire Volume, as we have now, we could never have our certificates recognized at the lines. I have had several conferences with Mr. Fisher, and I think it will be a very short time now until we get our certificates recognized at the lines.

Mr. WADE: If we can only get Mr. Winslow and his Directors to consent there will be very little trouble in getting the Washington Government to withdraw the objectionable ruling.

Mr. R. DAVIES: I think you are entirely too loose in all your markings. I would designate the same as you would in the Jerseys, say where they are red, where they are white and where they are brown.

Mr. HODSON: Supposing you take that strawberry cow of yours, how would you designate its markings? You have some there you really could not do it with, and probably 75 per cent. of the animals sent in would not or could not be designated as regards color.

Mr. YUILL: Some breeds of cattle count to color, but in Ayrshires color does not count anything in the 100 points that are to fill.

After a little further discussion on the matter of giving a detailed description of every Ayrshire sent in for registration, the matter was dropped, as it was the opinion

of the majority present that the ear markers answered the purpose of recognizing an animal better than a full description of the color would.

A committee, at this period of the meeting, consisting of Messrs. Stewart, Kains and Brooks, was appointed to draft a resolution regarding the work of the special committee appointed at the last annual meeting.

Their report is as follows : "Be it resolved, that we, as a Board of Directors, having heard the report of the committee appointed at the last annual meeting to investigate the matter of amalgamation, do hereby move that the same be received and adopted."

Mr. DAVIES said he thought the minutes since amalgamation, also the Constitution and By-Laws, should be printed and a copy submitted to every member of the Association, as, by doing this, it would be the means of stimulating the Ayrshire business all over Ontario.

Mr. HODSON suggested that the Secretary prepare a detailed account of all the business transacted by the committee, and he thought by sending same to *Farming*, the *Farmers' Advocate* and probably the *Sun*, they would print it in their next issue, then Mr. Wade could procure sufficient copies to send one to every member.

Moved by ROBERT DAVIES, seconded by WILLIAM STEWART. "That the Secretary prepare a detailed account, in duplicate, of all the business transacted by the committee since the last annual meeting, and send a copy to the *Farmers' Advocate* and one to *Farming*. Also, that a copy of the issue of said papers containing the report be sent to each member of the Association." Carried.

DELEGATES TO THE DIFFERENT EXHIBITIONS.—Resolved that the Secretary be instructed to present the following names to the annual meeting :

Toronto Industrial.—W. W. Ballantyne, Stratford ; William Stewart, Menie.

London Western.—A. Kains, Byron ; R. S. Brooks, Brantford.

Ottawa Central.—J. C. Smith, Hintonburg ; Joseph Yuill, Carleton Place.

JUDGES RECOMMENDED. The following resolution was adopted : Resolved that the one judge system be recommended for all large shows.

The following gentlemen's names were recommended to the annual meeting :

For Toronto.—A. Kains, Byron ; John Douglas, M.P.P., (Reserve) Warkworth.

For London.—Daniel Drummond, Petite Cote, Que. ; J. C. Smith, (Reserve) Hintonburg.

For Ottawa.—W. W. Ballantyne, Stratford ; Daniel Drummond, (Reserve) Petite Cote, Que.

"Resolved, That the Exhibition Committees be requested to have the herds at the different large shows judged first, as it is the opinion of this Association it would be more satisfactory to all breeders exhibiting." Carried.

The following resolution was then drawn up in reference to Mr. Jas. McCormack.

Moved by J. C. SMITH, of Hintonburg, seconded by W. W. Ballantyne, of Stratford, "That we, the Directors of the Dominion Ayrshire Breeders' Association, assembled, regret to hear of the illness of Mr. Jas. McCormack and his inability to be present at the meeting ; and that he has our profound sympathy in his affliction." Carried.

Moved by F. W. HODSON, seconded by ROBERT DAVIES, "That the Directors attending this meeting be paid their railway expenses and $1 a day for hotel expenses, from the time they leave home until the time they return thereto, and that they return by as short a route as possible." Carried.

The meeting adjourned at 5 p.m.

AYRSHIRE BREEDERS IN CANADA HAVE DECIDED TO PUBLISH ONE RECORD ONLY.

At the last annual meeting of the Dominion Ayrshire Breeders' Association a committee was appointed to open negotiations with the Canadian Ayrshire Breeders' Association at Quebec with a view to establishing one Ayrshire Breeders' Association for the Dominion and of issuing one Herd Book. The committee was appointed and the work proceeded with at once. The following are the minutes of the various committees, which give particulars, showing what has been done up to date. The work, as the following minutes show, has been very successfully completed, and the thanks of the Ayrshire breeders of Canada are due to the joint committee appointed to conduct these negotiations.

Minutes of meeting of delegates from Canadian and Dominion Ayrshire Breeders' Associations, held at the office of the Central Canadian Exhibition Association, March 10th, 1898:

Delegates present, from Quebec Association: Robert Ness, Howick, Que.; David Benning, Williamstown, Ont.; John Morrin, Belle Riviere, Que.; Daniel Drummond, Petite Cote, Que.; and F. W. Stephen, Trout River, Que. From the Ontario Association: W. Ballantyne, Stratford; Joseph Yuill, Carleton Place; J. C. Smith, Hintonburg; F. W. Hodson and H. Wade, Toronto.

Mr. Robert Ness was appointed chairman and H. Wade, secretary of the meeting. Letters were read from the secretaries of the different Associations, giving the names of the delegates as above.

Moved by Jos. Yuill, seconded by D. Benning, and resolved: "That it will be to the interest of the breeders and owners of Ayrshire cattle that the present two Ayrshire Associations amalgamate."

The then financial standing of the two Associations was as follows: The Quebec Association had $210 on hand and the Ontario Association on the first of January last had $418.49. The Ontario Association had nine directors, a president and vice-president. The Quebec Association had ten directors, a president and vice-president.

The delegates from the Ontario Association explained that, by a resolution passed at their last annual meeting, they were empowered with authority to enter into amalgamation, if they thought proper to do so. The Quebec delegation explained that they would have to report the result of their meeting to a special general meeting of their members, which would be called together specially after a short notice.

In case of amalgamation it was decided to call the new Association "The Canadian Ayrshire Cattle Breeders' Association." That the number of directors be fourteen, seven from Quebec and eastward, and seven from Ontario and westward, and that they choose from amongst their number a president and a vice president.

That the term of office for directors be for two years after the first year. That the annual meeting be held alternately in Montreal and Toronto. When held in Montreal the seven eastern directors' term of office will expire, and when held in Toronto the seven western directors' term of office will expire.

The annual meeting to be held in February of each and every year.

After due consideration the following plan of registration of animals and printing of the Herd Book was adopted, viz.: That a new Herd Book to be called "The Canadian Ayrshire Herd Book" be started, commencing with the next to the highest number in the Volume of the Quebec book now in print, and that the pedigrees of this book be abbreviated, only giving the sex, color, age, sire, grandsire, dam, and sire of dam, and that they be numbered consecutively irrespective of sex, then quoting as foundation stock the names and numbers of their sires and dams from either the Quebec or Ontario book, where the rest of the pedigree will be found, thus doing away with the necessity of reprinting the pedigrees that have already been printed, and leaving the volumes already printed of as much value as heretofore.

The standard of the new book to be as before, that no animal be accepted that can not trace to imported stock from Great Britain, on both side of sire and dam. Animals imported after January 1st, 1899, must be recorded in the Scotch Herd Book to be eligible to record in this record. That the fee to become a member be $2 per annum. Becoming a member entitles each member to a volume of the Herd Book as well as to reduced rates of registration.

Fees to record an animal under two years of age, as per Herd Book, with certificate to a member	$ 75
Fees to record an animal, etc., to a non-member	1 25
Fees for transfer certificate, duplicate certificate, each	25
Fees to record an animal over two years to a member	1 00
Fees to record an animal over two years to a non-member	1 75
Fees for an extended pedigree	25

It was resolved that the new book be edited by the Secretary at Toronto, who will pass on and issue pedigrees under rules furnished by the Executive Committee and correct proof for a fee of 35 cents per pedigree and 10 cents per transfer or duplicate certificate. Also that a secretary be appointed at Montreal at such a salary as the Executive Committee shall think fit to allow.

It was moved by Jos. Yuill, seconded by F. W. Hodson, and resolved, "That all pedigrees that were allowed to be recorded in the different volumes by an arbitration that cannot be clearly traced be suspended until additional information can be obtained by the following committee, appointed for the purpose of investigating and finally deciding whether these pedigrees can be accepted for the new book or not. This committee consists of Messrs. R. Ness, D. Drummond and H. Wade."

It was also finally resolved that the two Associations shall amalgamate on the basis of the resolutions as above. That the present directors of each Association be the directors of the joint Association for 1898 and till the next annual meeting in February, 1899, which shall be held in the city of Montreal; also that the president of the Quebec Association be president and chairman of the joint Association, and the president of the Ontario Association be the vice-president of the joint Association, and that the present joint committee be the Executive Committee for the joint committee up to that date.

It was also resolved that the unprinted pedigrees of the Ontario book be printed in the first part of the new volume in the same manner as before to prevent the confusion in numbering, and that the fifth volume of the Quebec Herd Book, now being printed, be also accepted as part of the series. It was also resolved that back numbers of both the Quebec and Ontario books be sold at the rate of $1 per volume.

These resolutions were adopted unanimously by the joint committee.

Minutes of adjourned meeting of delegates from Canadian and Dominion Ayrshire Breeders' Associations, held at the office of the Exhibition Association, Montreal, March 25th, 1898:

Same delegates present as at the meeting held on March 10th, with R Ness, of Howick, Que., in the chair.

The minutes of the meeting held in Ottawa on March 10th were adopted.

The secretary of the Quebec Association, Mr. Berube, then read a resolution passed at a meeting of the members of the Ayrshire Importers and Breeders' Association, held in Montreal, on the 21st inst.

After a long discussion, it was moved by Mr. J. L. Wilson, seconded by Geo. H. Muir, and resolved, "That the report just read be received and adopted, and that the Executive Committee be empowered to make final arrangements with the special committee of the Dominion Ayrshire Breeders' Association and enter into amalgamation."

It was then moved by Jos. Yuill seconded by D. Drummond, "That we, the authorized delegates from the Ayrshire Breeders' Associations, do hereby agree to

amalgamate on the basis of resolutions already reported from the Ottawa meeting, and that, from this date, March 25th, 1898, there be only one Ayrshire Breeders' Association for the Dominion of Canada." Carried.

Moved by F. W. STEPHEN, and seconded by W. W. BALLANTYNE, and resolved, "That all properties now owned by the two Associations, such as cash on hand, herd books, pedigrees and applications for pedigrees, etc, from this date be the property of the newly organized Canadian Ayrshire Breeders' Association."

It was also resolved, That the Stay There Ear Markers, made of aluminum, and supplied by Wilcox & Harvey Mfg. Co., of Chicago, Ill., U.S., be used by this Association, and a tag with a corresponding number to the number on the certificate be supplied with each pedigree, with the understanding that it be put in the ear of the animal that is recorded—that the Exhibition Associations be requested to pass resolutions insisting that these tags be in the ears of all animals of this breed exhibited.

It was resolved that the photograph of the late S. C. Stevenson be procured and published in the frontispiece of the 5th Volume of the Canada Ayrshire Herd Book, and one of Mr. Robert Ness, president, and one of Mr. H. Wade, be published in the first volume of the new edition.

On motion of J. C. SMITH, seconded by D. DRUMMOND, it was resolved, "That the names of all persons recommended at the annual meetings for judges for the various exhibitions shall be selected by ballot, requiring a two-thirds majority." Carried.

The constitution and by-laws as prepared by Mr. Wade were then read, corrected and approved of.

CONSTITUTION.

PREAMBLE.

In consequence of the Basis of Union agreed upon by the representatives of the Canada Ayrshire Importers and Breeders' Association, and the Dominion Ayrshire Breeders' Association at a meeting held in Ottawa, Thursday, the 10th March, 1898, it becomes necessary to revise the constitution.

ARTICLE I.

Section 1. Name. This Association shall be called the Canadian Ayrshire Breeders' Association.

ARTICLE II.

Section 1. Membership. The present members of the Canadian Ayshire Breeders and Importers' Association, and the members of the Dominion Ayrshire Breeders' Association, shall constitute the original members of the Association.

Section 2. Any person taking an interest in Ayrshire cattle, who, having signified to the secretary his desire to become a member and pay such fees as may be prescribed by by-law, may do so.

Section 3. Defining membership. Every member shall be an annual member.

Section 4. Membership; how terminated. A member may at any time withdraw from the Association by giving three months' notice in writing to the Executive Committee, through their Secretary, providing he has paid up all his fees. Any member who shall fail to observe any rule, regulation or by-law of the Association, or whose conduct shall be, in the opinion of the Executive Committee prejudicial to the interests of the Association, may be suspended by the committee from the privileges of membership, and the committee shall report all such cases to the general meeting of the Association, when after the suspended member shall have been heard, if he so desires, it shall be competent for a two-thirds majority of those present, and voting, to remove such person from the membership of the Association. Information that it was intended to propose such a resolution shall have been given in the notice calling the general meeting.

ARTICLE III.

Section 1. Object of the Association. To preserve the purity of Ayrshire cattle and to further the interests of the breed in every legitimate way.

ARTICLE IV.

Section 1. Income of the Association. The income and property of the Association, from whatever source derived, shall be applied solely towards the promotion and furtherance of the objects of the Association.

ARTICLE V.

Section 1. Officers. The officers of this Association shall consist of a president, a vice-president, and one vice-president from each of the Provinces in the Dominion represented, a secretary, also an assistant secretary in any Province that may require one,

Section 2. The term of office of the president and vice-president shall be one year and until their successors are elected. The term of office of the secretaries shall be during pleasure.

Section 3. Directors. The directorate shall consist of fourteen members, seven from Quebec and eastward, and seven from Ontario and westward, five of whom shall form a quorum. They shall choose from amongst their number a president and vice-president. That the term of office for director be two years after the first year. That the annual meeting be held alternately in Montreal and Toronto. When held in Montreal the seven eastern directors' term of office will expire, and when held in Toronto the seven western directors' term of office will expire. The annual meeting to be held in the month of February in each and every year.

Section 4. At the annual general meeting in each year the directors shall elect from among themselves six members to serve on the Executive Committee for that year, three from the east and three from the west. The president and vice-president shall be *ex-officio* members of the Executive Committee.

ARTICLE VI.

Section 1. Officers' duties. The President shall preside at all meetings of the Association and at the Executive Committee; shall appoint all other committees not otherwise provided for: exercise a general supervision over all the affairs of the Association, and perform such other duties as may be prescribed from time to time by the Association.

Section 2. The vice-president shall, in the absence of, or, if on the request of, the president, perform his duties. The vice-presidents from the more remote provinces shall, if necessary, form branch organizations of this association, to be governed by similar rules, regulations or orders. He shall, when necessary, convene meetings of the members of this Association residing in the same Province, appoint a secretary if the business to be transacted is of sufficient importance to allow of such being done, if not, he shall act as secretary himself, reporting all business done to the Executive Committee at headquarters.

Section 3. Secretary. The secretary shall keep a full and true account of the proceedings of the Association and of the Executive Committee; receive all moneys paid in for the various purposes of the Association, attend to all correspondence of the office, and sign all pedigree certificates. As editor of the Herd Book he will examine and revise the proof of each book, and will be the responsible officer of the Association. To be remunerated by a commission.

Section 4. The eastern secretary (if there be one) shall keep a true and full account of the proceedings of the Executive Committee of his Province, shall assist breeders to fill up their application forms, keep a copy of such form in the letter book or enter it up in the ledger, sending the original application for pedigrees, with fees, to the office where the certificates are issued, and do such other service as the president, vice-president, or local committee shall require, and receive what salary such committee shall determine upon.

Section 5. Directors. The directors shall have power to do all that may be incidental or conducive to the objects of the Association, and shall be generally charged with the administration of its affairs, and shall have the power of the appointment and dismissal of the employees of the Association. They shall cause all moneys received by the Association to be deposited in one of the chartered banks, and all payments shall be made by cheques signed by the president and countersigned by the secretary. The directors shall convene special meetings of the Association from time to time, as occasion may require. A meeting of the Association shall be called at any time by the president at the request of six members of the Association.

Section 6. A regular annual meeting of the Association shall be held in ths month of February in each year, for the purpose of the election of members of the directorate, to receive the report of the auditor and to appoint auditors for the ensuing year, and to transact any other business that may be presented.

Section 7. The voting shall take place as follows: Each member who wishes to vote shall give a voting aper with the names of seven members of the Association written thereon, for whom the member desires to vote. The chairman shall then appoint scrutineers, who will meet privately and count the votes and present the count to the meeting, and the members having the largest number of votes shall be declared elected.

Section 8. All matters, when not otherwise provided for, shall be decided by a majority of votes of the members present, and in case of an equality the chairman shall have the casting vote.

BY-LAWS.

Section 1. Persons desirous of becoming members shall notify the secretary, pay the entrance fee, and agree, if elected, to conform to the rules of the Association, and not to withdraw without giving three months' notice of their intention of doing so.

Section 2. Members shall pay an annual subscription fee of $2, which shall be due and payable on the first of January of each year.

Section 3. When a member joins during the last quarter of any year, his annual subscription shall be counted as being paid for the ensuing year, but he will not be entitled to receive the publication of the then current year fee.

Section 4. Under the Constitution, the Executive Committee may suspend any member, and a two-thirds majority of the annual meeting shall remove any person from membership in the Association, should the conduct of such person prove to be derogatory to the character or prejudicial to the interest of the Association.

Section 5. Members shall keep the secretary advised of their postoffice address, and all communications shall be considered as delivered which have been mailed, properly addressed and prepaid.

Section 6. Ten days before any general meeting, notice thereof and the business to be transacted thereat shall be mailed to every member.

Section 7. No member whose subscription is in arrears shall be allowed to take part in any meeting until such arrears are paid.

Section 8. Directors shall meet from time to time, as occasion requires, at the call of the president.

Section 9. A revising committee, consisting of five members, shall be appointed by the directors each year, of whom three shall form a quorum, whose duty shall be to investigate all pedigrees reserved for their decision by the secretary, or the integrity of which may have been called into question. This committee shall meet at the call of the secretary. All pedigrees considered not up to the standard shall be reported to the directorate at the next meeting for final adjudication, the interested party or parties to receive timely notice of the same from the secretary, that he or they may have the opportunity of attending at such meeting in his or their own interest.

Section 10. The secretary shall be directly responsible to the directors for the discharge of the various duties which he may be called upon to perform.

Section 11. All moneys received shall be entered by the secretary in the cash book, and shall be deposited in one of the chartered banks The directors shall pay the secretary small sums for postage, etc., and accept receipts for postage stamps received and used.

Section 12. No animal shall be admitted for registry in the Canadian Ayrshire Herd Book except those whose pedigrees trace in all their crosses to imported animals registered in the Scotch Herd Book. Registrations in the Scotch Herd Book of stock imported previous to 1899 will not be required ; those imported in 1899 must trace to ancestry distinctly designated, but, owing to the difficulty in keeping proper records prior to that date, it will be sufficient to know that the ancestry has been imported.

Section 13. Fees. Quoted in March meeting.

Section 14. After the rules for recording pedigrees have once been adopted and established, no change thereof shall be made, except by a vote of two-thirds of the members present at the annual meeting, notice being given one year previous of the proposed change. Written notice shall be sent to the secretary, who shall cause said notice to be published in some stock journal of general circulation in the Dominion.

Section 15. At any regular or special meeting of the Association these by-laws, except section 12, may be changed or amended by a majority of all the members present voting.

The distinguishing symbol in the Canadian Ayrshire Herd Book will be a dash, as — 100 —.

MEETINGS OF SPECIAL COMMITTEES.

Minutes of a meeting of the Special Committee to examine pedigrees held at Montreal on July 23rd, 1898 :

Present : R. Ness, president ; D. Drummond, Pettite Cote, Que., and H. Wade, secretary, Toronto.

The secretary stated that Mr. Gardiner, of Charlottetown, P.E.I., had offered to sell the copyright and manuscript of the Prince Edward Island Herd Book for $100. The committee, as far as they could, authorized the secretary to obtain the records It was also thought best to secure the Ayrshire papers from Mr. Rodden, even if they had to pay something for them. The secretary was also requested to send certificates and tags to the breeders direct instead of to the Montreal office, where they would have to be re-mailed at an additional cost.

Minutes of a meeting of the Special Executive Committee held at the Agricultural Tent, at the Industrial Exhibition grounds, on the 7th of September, 1898 :

Present : R. Ness, president ; W. M. Smith, vice-president ; Joseph Yuill, W. F. Stephen ; F. W. Hodson, and H. Wade, secretary.

The minutes of the Special Committee meeting held in July at Montreal were read and considered.

Moved by F. W. Hodson, seconded by Joseph Yuill, " That this committee approve of the action taken by the Special Committee at Montreal, in authorizing the secretary to pay $100 for the Prince Edward Island Ayrshire Herd Book and good-will, and confirm the agreement." Carried.

Moved by F. W. Hodson, seconded by Joseph Yuill, "That the secretary be authorized to wait on executors of Mr. Wm. Rodden at Plantagenet during the Ottawa exhibition, and make the best arrangements he could to procure the books and papers belonging to the Association, held by the late William Rodden." Carried.

Moved by W. F. Stephen, seconded by W. M Smith, "That the arrangement made by the Special Committee in Montreal, as regards certificates being sent direct to the breeders, be confirmed, as far as the pedigrees written in English are concerned. As to those written in French, the secretary be authorized to have certificates prepared with one side printed in English and the other in French, both sides to be signed by the egistrar. The French side to be filled in by the Montreal secretary."

A general conversation took place as to the amount of salary to be paid the eastern secretary. The general opinion of the meeting was that $10 per month would be sufficient No motion, however, was presented and the matter was left in abeyance.

Minutes of special meeting of Eastern Committee, held in Montreal on the 16th of December, 1898 :

Present : R. Ness, chairman ; John Morrin, Daniel Drummond, W. F. Stephen and H. Wade.

Minutes of last meeting were read and confirmed.

Mr. Wade explained that he had asked the president to call this meeting to arrive at an understanding by taking stock, and to get a financial statement of the eastern Association up to the time of amalgamation and since, as well as to fix the amount of salary for the eastern secretary, in order to get a settlement with him.

Mr. Berube then presented a statement of their Association up to amalgamation on March 25th. 1898. It has not been sent forward yet. All that I remember is, that there would be a slight deficiency after paying for the 5th volume. The financial statement since then will be found in the treasurer's report.

Moved by D. Drummond, seconded by John Morrin, That all the herd books, vouchers and papers, with the exception of the office set of herd books, be packed up in cases and sent to the Toronto office ; also that a list of the present members of the Canada Association be sent, as it was deemed more expedient to collect members' fees and dispense herd books from the one office.

It was resolved that Mr. Wade send out cards to all members of the combined Association, calling attention to the fact that the fee of $2 will be due on the 1st of January next for 1899, and to send it direct to the Toronto office. It was resolved that a set of rules be prepared for the guidance of the secretary at Montreal, and that one copy be sent him.

The matter of the salary of the eastern secretary was taken up. Mr. Berube was called in and stated that he had a great deal of work to do, which was well worth $25 per month. After much consideration the committee agreed to pay him $100 from the 1st of June, 1898, to the date of the annual meeting in February. After deliberation, Mr. Berube agreed to accept this sum, which was paid to him, he stating that he could not afford to do the work for the future at the rate of $10 per month, which was offered to him.

Mr. Wade stayed over till the next day, and had a full settlement up to date .

The following is a list of books sent to the Toronto office :

Vol. 1, 93 copies bound in cloth.

Vol. 2, 121 copies bound in cloth.

Vol. 3, 160 (62 bound in cloth, 99 in paper).

Vol. 4, 114.

Vol. 5, 90 copies bound in paper.

578 copies in all.

At a meeting of the Directors of the Dominion Ayrshire Breeders' Association, held in the Albion Hotel, Toronto, on January 17th, 1899, the Secretary read the minutes of all business transacted at and since amalgamation. A committee was appointed to draft a resolution in the following manner:

Be it resolved, That we, as a Board of Directors, having heard the report of the Committee appointed at our last annual meeting to investigate the matter of amalgamation, do hereby move that the same be received and adopted.

(Signed) Wm. Stewart, R. S. Brooks, A. Kains, } Committee.

ANNUAL MEETING OF THE CANADIAN AYRSHIRE BREEDERS' ASSOCIATION.

The first annual meeting of the amalgamated Dominion and Canada Ayrshire Breeders' Associations, convened in the Eastern Office, Monument National, 218 St. Lawrence street, Montreal, at 2 p.m., February 15th, 1899.

The following members were present: R. Ness, president, in the chair; Messrs. Joseph Yuill, Carleton Place; John Hamilton, Grande Freniere, Que; D. Drummond, Petite Cote, Que.; A. Hume, Burnbrae; R. S. Brooks, Brantford; W. F. Stephen, Trout River, Que.; W. Stewart, jr., Menie, Ont.; W. W. Ballantyne, Stratford; A. Kains, Byron; W. M. Smith, Fairfield Plains; James McCormack, Rockton; R. G. Steacy, Lyn; D. Benning, Williamstown; F. W. Hodson, Toronto; John Hay, Lachute, Que.; Thomas Drysdale, Allan's Corners, Que.; Horace Lamarche, St, Esprit, Que.; Dennis Hurley, Vankleek Hill; J. G. Clark, Ottawa; Ralph Henry, Ottawa; R. Hunter, Maxville; D. Cumming, Lancaster; James Johnston, Montreal; Nap. Lachapelle, St. Paul l'Hermite, Que.; John Morrin, Belle Riviere, Que.; A. Cleland, Petite Cote, Que.; Alex. Drummond, Petite Cote, Que.; Wm. Hay, Howick, Que.; Robert R. Ness, Howick, Que.; James Bryson, Allan's Corners, Que.; Thomas Irving, Petite Cote, Que.; J. L. Wilson, Alexandria; T. D. McCallum, Danville, Que; Theophile Trudel, St. Prosper, Que.; Hon. Senator Owens, Montreal; Mr. Boa, St. Laurent, Que.; H. Wade, Toronto, Secretary-Treasurer.

The President: You are all aware of the reason of this first meeting of our joint Associations. It is needless for me to say that we have had a good year as far as Ayrshire breeders are concerned. I think that the amalgamation of the Ayrshire interests will greatly increase, and by having one association we will be much stronger.

It affords me great pleasure at this stage of the meeting to be able to say to you we have with us the secretary of the Ayrshire Association of one of the greatest countries in the world, and I think it is a pleasure to have that gentleman come and recognize us here to-day—that is Mr. C. M. Winslow of the American Herd Book.

I will now call upon the secretary, Mr. Wade, to read the minutes of the previous meetings and his annual report.

As all the business transacted since amalgamation had been all published in the Live Stock papers and one sent to each member of the Association, it was resolved that the minutes be taken as read.

REPORT OF THE SECRETARY.

Following is a report to the first meeting after amalgamation between the Canada and the Dominion Ayrshire Breeders' Associations, being the annual meeting of the Canada and the twelfth annual meeing of the Dominion Association.

The past year has been an historical one. The breeders of Ayrshires, previous to a year ago, were recording animals in the Dominion Herd Book with two distinct classes of pedigrees, namely, those that traced to importation on side of both sire and dam, and

those that could not be traced on the dam's side clearly to an imported cow, were published in what we called the Appendix, although, doubtless, if dead men could speak, several of this latter class could qualify for the higher standard. Owing to the neglect of keeping private records the history of several families of imported Ayrshires has been lost track of, especially in New Brunswick and Nova Scotia, as well as nearer home. It took a surgical operation a year ago at the annual meeting at Toronto to extract the Appendix from the body of the Dominion Book. Then came amalgamation with our friends from this Province, another historical feature of the year, which doubtless will work wonders in the way of renewed prosperity, life and energy in the Ayrshire cause, as this new Association will soon, we hope, be a power in the land.

There is no doubt that amalgamation at first has caused a great disappointment to some of the breeders, as, unfortunately, several pedigrees in the Canada Book were the same as those that were in the Appendix of the Dominion Book, and consequently had to have the knife used to cut them out also. It would give the committee on the standard of pedigrees great pleasure if they could meet some one who could clear up the early history of some of the cattle bred and raised in this immediate neighborhood.

The reason why this stand has been made is, that the directors of this Association do not wish to record any animals in the new Canadian Book that will not record in the American book. The standard now is the same, and no doubt a much larger trade will be done in the future with our American friends, so it would be useless keeping on record animals that would not record with them. We also wish the American Government to recognise our certificates at the lines by the custom authorities, and, without the high standard we are aiming at, it would be useless to make the attempt.

There are no better Ayrshire cattle in the world at the present day than what we have in Canada. We have constantly, for several years back, been importing the very best from Scotland to cross with those in this country, and it is well known that Canada is one of the best breeding grounds for cattle in the world. Therefore, we must look forward to increased sales to the United States and our own Northwest Provinces, and must take great pains to breed the very best for dairy purposes, making selections of breeding animals from the best milking strains—with large udders and teats, also carefully looking to conformation in the rest of the body.

Members. The membership last year consisted of eighty-two gentlemen, eleven of these being from Quebec since amalgamation, the income from which amounted to $164. The members' fees to the Canada Association, previous to amalgamation, were from fifty-seven members, and are accounted for in the statement of that Association. I expect the membership for the present year will be very much increased.

Registrations. We have been paid for 1,115 pedigrees during the past year, 418 of these coming from the Montreal office. We expect to increase this number materially this year, as we are now recording all the Ayrshires that are eligible from the Atlantic to the Pacific Coast. A great many pedigrees of ancestors have also been recorded free of charge, according to an agreement entered into at the last annual meeting of the Dominion Association that for a year these should come in so as to allow the Maritime Province breeders a chance to record in the Canada Ayrshire book without too much expense. The "Stay There" aluminum tag, sent with each certificate, is giving good satisfaction.

Herd Books. The third volume of the Dominion book was issued late in 1897, and the fifth volume of the Canada book in 1898. This makes eight volumes from the two Associations, so that the next volume will be called the ninth volume, and will contain in the front of the book the pedigrees recorded by the Dominion Association since the closing of their third volume—continuing their numbers. The rest of the book will contain the pedigrees recorded since amalgamation, continuing the numbers from the Quebec book, they being the highest. We now have altogether 1,915 pedigrees ready to publish in volume nine, which can be made up to 2,000 if necessary. We will commence at once, if authorized by the executive committee. The plan for printing and abbreviating has been fully published in the late editions of the agricultural papers of the Province, copies of which have been sent to members. The right and title to the Ayrshire Herd Book

in Prince Edward Island was purchased from Mr. C. C. Gardiner, of Charlottetown, for $100, so we now record all the Ayrshire animals from that Island, as well as increased numbers from Nova Scotia and New Brunswick.

EXHIBITIONS. We paid out in 1898 $135 00 for prizes at some of our larger Provincial exhibitions. I am afraid, in consequence of the additional expense caused by amalgamation, this will have to be discontinued for this present year. Ayrshire cattle were well brought out at the different shows during the past year, a great many sales were made at satisfactory prices, and Ayrshire breeders have every reason to be satisfied with the year's results.

At the Provincial Fat Stock and Dairy Show held at Brantford in December last, the following prizes were awarded for Ayrshires :

Prizes won will be increased one-half by the Ayrshire Breeders' Association.

Section 1. Cow, 36 months and over, 1st $25, 2nd $15, 3rd $10.

1st prize, N. Dyment, Clappison—Nellie Gray —2057— ; sire, Royal Chief —75— ; dam, Maggie Brown —5099— $25.

2nd prize, N. Dyment, Clappison—Briery Banks Cora —2846— ; sire, Albion Chief —868— ; dam, Morag of Lee —1479— $15.

3rd prize, W. M. & J. C. Smith, Fairfield Plains, Dolly Duchess —2746— ; sire, Macneil —771— ; dam, Dolly —1834— $15.

Section 2. Cow, under 36 months, 1st $25, 2nd $15, 3rd $10.

1st prize, W. M. & J. C. Smith, Fairfield Plains, Fanny of Fairfield —3307— ; sire, Richard B. —1813— ; dam, Annie Laurie —2492— $25.

2nd prize, Jas. McCormack & Sons, Rockton Ont., Primrose 9th —3012— ; sire, Jock Morton —1386— ; dam, Primrose —2991— $15.

3rd prize, N. Dyment, Clappison, Pearl of Hickory Hill —3365— ; sire, Guy Fawkes —1756— ; dam, Dandy —2223— $10.

	Nov. 30th.		Dec. 1st.	
Over 36 months.	lbs. milk.	p.c. fat.	lbs. milk.	p.c. fat.
N. Dyment, "Nellie Gray"	30.	4 2	31 25	4.2
N. Dyment, "Briery Banks Cora"	30.25	3.6	33 75	4 4
W. M. & J. C. Smith, "Dolly Duchess"	30.25	3.7	27.25	3.
J. K. Alexander	25.	3.4	25.	3.6
Under 36 months.				
W. M. & J. C. Smith, "Fanny of Fairfield"	31.25	3 2	32.25	3.4
Jas. McCormack & Sons, "Primrose 9th"	29.	3.1	30 25	3.2
N. Dyment, "Pearl of Hickory Hill"	27.25	3.2	25 75	3.4
W. M. & J. C. Smith	15.	3.8	15.25	3.2

FINANCIAL STATEMENT FOR THE YEAR ENDING DEC. 31ST, 1898.

1898.			1898.		
Jan. 1st.	To balance on hand	$ 418 48	Dec. 31st.	By prizes	$135 00
Dec. 31st.	To registration fees 1,115 pedigrees	1,005 10		" Printing and stationery.	131 66
	Membership fees, 82 members @ $2.00	164 00		" Tags	82 13
				" P. E. Island book	100 00
				" Herd Book and Rodden.	70 40
				" Committee fees $265 0	
				" Commissions . . 414 85	
					679 95
				" Salaries	110 00
				Postage and telegrams	30 77
				Balance	247 67
		$1,587 58			$1,587 58

Assets and Liabilities.

1898.				
Dec. 1.	Balance, cash on hand	$247 67	Balance brought forward....	$971 57
	578 Vols. Quebec Herd Book @ $1.00.....	578 00	John Lovell & Son, IV. Vol. Can ...	114 80
	297 Vols. Canadian Herd Book @ $1.00....	297 00	Perrault Printing Co., Vol. 5.....	23 00
			J. P. L. Berube.....	13 30
		$1,122 67		$1,122 67

I hereby certify that I have examined the books and accounts of the Dominion Ayrshire Breeders' Association and that the above statement is in accordance therewith.

CHAS. F. COMPLIN,
Auditor.

TORONTO, Jan. 21st, 1899.

After the Secretary's report had been read the following discussion took place:

JAS JOHNSTON: Why was it that the Executive Committee was not called by the Special Committee before amalgamation was effected? These delegates went up to Ottawa from the Executive and they were to report back to the Executive, which they never did.

The PRESIDENT: From memory I think we called a special meeting of the Association and the whole thing was ventilated there.

JAS. JOHNSON: We called a meeting of the Association and they left it to the Executive Committee; they appointed delegates and these delegates were to report back to the Executive. I think if you look at the minutes you will see I am right.

The PRESIDENT: The Executive are certainly part of the Association, and the members of it should have been at that meeting.

It was then moved by F. W. HODSON, seconded by W. W. BALLANTYNE, "That the minutes of all the past meetings be adopted. Carried unanimously, with the exception of one dissenting voice.

JAS. JOHNSTON: There are a lot of pedigrees descending from Bonnie Scotland that have been put on the shelf for the present. Would you explain the reasen? It means a great loss to the farmers of Quebec; in fact, it almost means the wiping out of the old Herd Book.

Mr. WADE: It was a cow called Lady of the Lake and her descendants that made the trouble.

JAS. JOHNSTON: You return my entries, and say that these pedigrees are cancelled for the present. Now, amalgamation was never brought about for this purpose. I think I will be backed up by a great many members present in saying that had they thought that the pedigree of Bonnie Scotland would have been brought into question there never would have been amalgamation. It means $20,000 loss, if not $75,000 loss, to the farmers of this Province if Bonnie Scotland is ejected from the Herd Book, as the very best cattle we have in the Province are descended from him.

Mr. WADE, Secretary: Mr. Cochrane decided that the termination I gave, copied from P. R. Wright's private register after arbitration, was correct. Mr. Rodden, the President, did not change the termination of the pedigree, but printed it the same as before, which was proved to be wrong. We carried out his decision in the Dominion Book saying, "brought in by arbitration," and pointing it out with an asterisk, and carrying it out with its proper termination, so the same pedigree was printed entirely different in the two books.

JAS. JOHNSTON: Why were these animals allowed to be published as pure-bred when they were known to be false?

Mr. WADE: At the arbitration Mr Cochrane said the termination I gave was correct, but thought after the animals were published so long as pure-bred, they should still be recorded as pure-bred Ayrshires, but he never dreamt you were going to keep them on with the wrong termination. There is nothing to hinder these animals being reinstated in the book if the ancestors can be properly traced. The sire of Buttercup is an imported Ayrshire bull and the dam is an imported Ayrshire cow. Can you give the names of the imported cow and bull? if so, there is nothing to hinder her from coming in at once.

Hon. Senator OWENS: This question was submitted to Mr. Cochrane for arbitration and his report has been read to you, but outside of that these animals should be registered as first-class Ayrshires. Whether it was right or wrong to allow these pedigrees to be accepted at the time of arbitration I think it is certainly wrong to raise the question to-day. From your information at that time Bonnie Scotland and his descendants were registered in this Herd Book, and parties purchased that stock under good faith—that the registrations in the Herd Book were correct, and to-day you would be doing a great injustice, you would be really robbing—stealing money—if you turn out these Ayrshires. It is quite evident that these animals were first-class Ayrshires from the fact that they were so numerous; it goes to show that the bulls have been sought by the breeders. Look at your records and you will find that a very large proportion descends from that animal, and now it would be a very great injustice to have him cancelled. If Mr. Cochrane's decision was not right, why the very act of your Association continuing this pedigree in the Herd Books is sufficient to make it right to-day. Those descendants have all been bred to first-class Ayrshires from that time. Now you come and adopt the pruning knife. You are going to strike off the registration of the best animals in the Province. I do not think we should go beyond what is necessary; but if you insist upon the striking out the records of that animal you will be injuring the records of the Association to a very great extent.

Mr. WADE: We do not want these animals struck out if they can be retained. We cannot accept them until you name the sire and dam of that cow. The United States, we hope, will buy freely of our cattle, and if we go on recording these animals and our friends purchase them and then cannot record them in their book it injures our book because they would not be accepted in theirs. You might as well try to send grades to have accepted. That is the strong point. We must make our book on a par with the American Book so as to interchange from time to time and go on without any trouble. I have been at Kingston and got proof that will record nearly all the animals previous to Lady of the Lake. I think there is only one lot now, and if I can get the information from a gentleman I know we will be able to record all up to these Ross cows.

The PRESIDENT: I assure you, gentlemen, we have taken every precaution. We have given the breeders every chance to hunt up this information, but everything must be right and the stock must trace to importation. I have bought animals from nearly every Ayrshire breeder in the Province, among them being Mr. Brown, and Mr. Irving, and probably some of my own herd would need the pruning knife. If so, I am quite willing to stand it in order to have a Herd Book of the very highest standard.

W. F. STEPHEN: I think even the funds of this Association should be used to work out these pedigrees, and if a lot of the breeders have these cattle it would be as well to join hands and get this matter ferreted out. I think it a very serious matter if our book at the lines could never be recognized on this account. I think, gentlemen, we should also either accept or reject the Secretary-Treasurer's report; but I think we should try and do things decently and in order.

Moved by W. F. STEPHEN, seconded by JOS. YUILL that the Secretary-Treasurer's report be adopted. Carried.

At this juncture of the meeting the President called upon Mr. C. M. WINSLOW, Secretary of the American Ayrshire Breeders' Association, for a few remarks.

Mr. C. M. WINSLOW: I am very glad to meet you here to day, but I did not come here to quarrel with you. Our Association met two weeks ago in New York, and the question came up of the Canadian meeting here to day, and they voted to allow me to

come up and bear the kindly greetings of our Association to the Canadian Association. From all accounts we have had from you lately you seem to say you are getting around to our old solid ground, going where you are going to get into bed rock. In union there is strength, and there ought to be the full sympathy of the Ayrshire Breeders in this amalgamation lately brought about. We certainly have the best cattle in the world. You certainly have the cattle, which, in the future, will come into the United States as the leading dairy cattle They are very rapidly coming that way now. The Jersey men have had their day; and while a number of Jersey men like to keep a few Jerseys to manufacture a little nice butter in an expensive way, and while the Holstein men are being thrown out (I hope there are no Holstein men here) the Ayrshire is coming to the front, as she is the cow for the dairy. I saw an article in the *Country Gentleman* making a great cry for the Holstein as a dairy animal, but the beautiful black and white go to the shambles, and then comes in the Ayrshires for milk. The Ayrshires to-day supply most of the population of Boston with milk, and the supply of milk they give commands the market for the Ayrshires over the fancy cows. You have lots of trouble with the Holstein, but very little with the Ayrshire. I think there is good reason for Ayrshire men all over the country pushing Ayrshire cattle to the front, because in that way you are doing a blessing to mankind. In regard to this matter of pedigrees—our Herd book, I think, is the oldest Herd Book in existence, even older than the Scotch. I know they started at first with an incomplete chain to importation, and we went along in this manner for a long time trying to cover it up and not to hurt anybody. Well, we went along in that way until finally our Association said they would put all doubtful pedigrees to one side. One and another said that did not help much, then we said we will put the thing right down to bed rock—we will have no animal recorded in our book except it traces in an unbroken line to importation, so any person buying an animal that is recorded in our book knows that animal traces to an imported animal of reliable importation. So it should be, when a man comes to you to buy some cattle and gets the name and number, he should not have to go or send to Toronto or Montreal to search the records for an hour or two in order to know whether they are from imported stock or not. It should be the very fact that that animal is recorded in your book is proof that it traces to importation, or to an imported animal, in every direction.

By our throwing out the doubtful ones it made a great deal of hard feeling; it hurt a great many men through it, and a great many valuable cattle were thrown out in some herds. It cuts some right out. I know one gentleman who had imported some very nice cattle and bred with the others he had year after year. He had not kept any track of the imported ones, simply let them mix among his own cattle and the consequence was they were all cut out. But we can see now why it was a wise move, because while it created a good deal of hardship it is gradually wearing away, and to-day, I think our Ayrshire Herd Book stands where it never would have stood, and every year that passes makes less trouble; and I think the sooner you get rid of these doubtful pedigrees the better. Of course there are clerical errors that arise sometimes, and my opinion of that matter is, the sooner the clerical errors are corrected the better. It is never too late to correct an error. If there are errors in Bonnie Scotland the errors should be corrected.

Mr. F. W. Hodson: Have you ever had any trouble with Appendix cattle from here?

Mr. Winslow: Yes, our breeders got some over there and it made a great deal of ill feeling—it hurt you.

Hon. Senator Owens: What date was it that the dam of Bonnie Scotland was brought in here? How long ago is it?

Mr. Wade: The original cow was imported by Mr. Murray of Three Rivers.

Hon. Senator Owens: Is it so far back that you cannot give me her date.

Mr. Wade: Lady of the Lake was calved January 8th, 1859, bred by Patrick R. Wright and bought by C. J. Fox. She took a prize in Hamilton in 1860 and 1861 and so on. It is four or five generations beyond Bonnie Scotland where the trouble comes in on the dam's side.

Hon. Senator OWENS: Here these animals have gone on for forty years, and it was settled by arbitration that it was right in recording them. Now the pedigrees are cancelled since amalgamation. I think there is nothing that would destroy the confidence of the breeders, not only in Canada but in the United States, quicker than objecting to these pedigrees now.

Mr. WADE: If that Ross cow pedigree can be proven then most of the obstacles in the way of registration will be removed. I think I can bring evidence to satisfy Mr. Winslow of the ancestry tracing to importation.

Moved by W. W. BALLANTYNE, seconded by A. KAINS, "That a committee be appointed to investigate this matter and report back to the meeting." Carried.

J. C. SMITH: We used the sire Bonnie Scotland for three years, and I for one favor expulsion until the proper termination is given.

Mr. DRUMMOND: I was at the arbitration in the Windsor Hotel. Mr. Jas. Cochrane was there, and at that time probably half my stock traced to that pedigree. Mr. Cochrane gave his decision, and when I left I decided to sell them, and most of them went to the butcher. That is what will have to be done now unless you can trace them straight. We have a good deal of work hunting up a pedigree now which should have been done by a committee thirty years ago There are books in Mr. Brodie's office that should have been seen years ago. I had the privilege of seeing pedigrees there dated away back in the fifties. Mr. Brodie said that nobody had ever looked at the book, and it is possible some information might be obtained there.

Moved by Mr. BODEN, seconded by J. LOCKIE WILSON, "That the committee to investigate the matter of Appendix pedigrees be composed of Hon. Senator Owens, Montreal, Jas. Johnston, Montreal, Thos. Irving, Petit Cote, Que., and H. Wade, Secretary." Carried.

THOS. IRVING: In 1848 I went home to the Old Country and brought out an Ayrshire cow, which showed the next year against one owned by Mr. Ross: he took first prize and I only took second, but I do not know her name.

Moved by JOSEPH YUILL, seconded by W. F. STEPHEN, "That while Mr. C. M. Winslow is in the city he be invited to be the guest of the Canadian Ayrshire Association, and Messrs. Ness and Wade be a committee to extend the invitation to him." Carried.

Mr. WINSLOW in a few remarks said he felt very highly complimented, and he was sure the American Association had the very highest feelings towards the Canadian Association.

The next matter that came before the meeting was that of trying to have the standard in the American Ayrshire Herd Book and Canadian Ayrshire Herd Book the same, and after a short talk over the matter, it was

Moved by F. W. HODSON, seconded by WM. STEWART, jr., "That a committee be appointed by the Canadian Ayrshire Breeders' Association to meet a committee from the American Ayrshire Breeders' Association and go over the standard of both books, with a view of making them precisely the same, if they are willing to co-operate with us in the matter." Carried.

Moved by W. W. BALLANTYNE, seconded by THOS. DRYSDALE, "That the committee appointed to wait on the American representatives be composed of F. W. Hodson, Robert Ness and Henry Wade." Carried.

Moved by J. C. SMITH, seconded by JOS. YUILL, "Whereas this Association has learned that purchasers of Ayrshire cattle for exportation to the United States are put to much inconvenience and delay in shipment because of the necessity under present regulations of registering in the American Herd Book in order to pass the customs, therefore resolved that, inasmuch as the standard of the Canadian Ayrshire Breeders' Association is precisely the same as that of the American record, and that such cattle to be useful in the United States must, in the end, be recorded there, this meeting is of

opinion that every interest would be subserved and properly protected by admitting Ayrshires on presentation to the customs authorities of properly accepted certificates of registration signed by the Registrar under the control of the Department of Agriculture of Ontario. Resolved further, that a committee, consisting of F. W. Hodson, W. F. Stephen and H. Wade, be hereby appointed to enlist the co-operation of the American Ayrshire Breeders' Association in presenting this view to the proper authorities at Washington." Carried.

Moved by J. Lockie Wilson, seconded by Thos. Drysdale, "That cheaper transportation for agricultural products, both by rail and ocean, is the most important problem to be solved by our law-makers, who are to assemble next month at Ottawa. Be it therefore resolved, that we the members of the Canadian Ayrshire Breeders' Association, in meeting assembled, are unalterably opposed to further grants or subsidies to companies promoting fast Atlantic passenger steamboat lines, and we would urge that the energies of our representatives in the Federal Parliament be utilized in securing cheaper and faster ocean freight carriers, and that all freight rates, fixed by rail and ocean carriers, be regulated by methods such as are in vogue in Great Britain, United States and all other civilized countries." Carried unanimously.

Moved by J. Lockie Wilson, seconded by John Hay, "That we adopt the two judge system for all exhibitions where Ayrshires are judged." Carried.

After the annual meeting a short meeting of the Directors was held, when the matter of salary to the eastern Secretary came up. After the matter had been fully discussed by all present the following resolution was drawn up:

Moved by W. W. Ballantyne, seconded by T. D. McCallum, "That the commission of the eastern Secretary of the Canadian Ayrshire Breeders' Association, Mr. J. P. L. Berube, be twenty cents per pedigree and five cents per transfer for every pedigree and transfer accepted at the Head Office, after passing through his hands, from February 15th, 1899, to February, 1900. Carried.

Moved by William Stewart, Jr., seconded by A. Drummond, "That the Secretary be instructed to pay the accounts of John Lovell & Son and Perrault Printing Company for printing the Fourth and Fifth volumes of the Canada Ayrshire Book." Carried.

Moved by F. W. Hodson, seconded by W. F. Stephen, "That hereafter delegates sent to attend to the business of this Association be paid their actual expenses from the time they leave home until they return, it being understood that they go and come by the nearest route and as quickly as possible after their duty is done." Carried.

AYRSHIRE PRIZE WINNERS AT THE TORONTO INDUSTRIAL EXHIBITION, 1898.

Bull, 3 years old and upward.

1st. Napoleon of Auchenbrain (imp.)—8303—(3303); yellow, brown and white; calved April 25th, 1895. Bred by Robt. Wallace, Auchenbrain, Mandeline, Ayrshire, Scotland. Imported by exhibitor; sire, Baron Wallace of Bogwood (3098); dam, Old Beauty's Last of Auchenbrain (6894). Exhibitor, Robt. Reford, St. Anne de Bellevue, Que.

2nd. Oliver Twist of Barcheskie (imp.)—2304—(3455); white and brown; calved April 4th, 1895. Bred by Thos. Barr, Monkland, Kilmarnock, Scotland. Imported by exhibitor; sire, White Cockade of Neither Craig (2852); dam, Cherry 1st of Monkland (vol. xviii, S. A. H. B). Exhibitor, Robt. Davies, Toronto.

3rd. Jock Morton—1386—; white and red; calved Sept. 7th, 1892. Bred by David Morton & Sons, Hamilton, Ont.; sire, Royal Chief (imp.)—75—(1647); dam, Beauty of Ayrshire—1202—(5508). Exhibitors, Jas. McCormack & Sons, Rockton, Ont.

4th Kelso Boy—6229—; red and white; calved August 15th, 1892. Bred by Duncan McLachlan, Petite Cote, Que.; sire, Silver King (imp.)—5309—; dam, Maggie Mitchell (imp.)—5837—. Exhibitor, Daniel Drummond, Petite Cote, Que.

Bull, 2 years old.

1st. Royal Star of St. Anne's—7916—; white and red; calved March 3rd, 1896. Bred by exhibitor; sire, Glencairn 3rd (imp.)—6915—; dam, Maggie of Williamstown—5659—. Exhibitor, Robt. Reford, St Anne de Bellevue, Que.

2nd. Drummond—2036—; white with red spots ; calved March 4th, 1896. Bred by A. Terrill, Wooler ; sire, Norman of Robertland—1901—; dam, Maggie—1116—. Exhibitor, N. Dyment, Clappison's Corners, Ont.
3rd. Dainty Lad of Elm Shade—2245—; white with brown spots ; calved Sept. 19th, 1895. Bred by Daniel Drummond, Petite Cote, Que. ; sire, Silver King (imp.)—1128—(5809)—; dam, Silver Blossom—2341—. Exhibitor, W. Stewart & Son, Meine, Ont.
4th. White Chief of St. Anne's—2086—; nearly white ; calved Aug. 18th, 1895. Bred by Robert Reford, St. Anne de Bellevue, Que.; sire, Glencairn 3rd (imp)—1658—; dam, White Floss—3064—. Exhibitors, Alex. Hume & Co., Burnbrae, Ont.

Bull, one year old.

1st. Duke of York 2nd (imp.)—2301—; mostly white ; calved March, 1897. Bred by Francis Young, Balnowlart, Ballantrae, Scotland. Imported by exhibitor ; sire, Duke of York of Hillhouse (2864) ; dam, Clara 3rd of Balnowlart (imp)—3381—(10501). Exhibitor, Robert Davies, Toronto.
2nd. Glencairn of Burnside—8153 ; white, with a little brown ; calved August 27th, 1896. Bred by Daniel Drummond, Petite Cote, Que.; sire, Glencairn of Maple Grove (imp. in dam)—6973—; dam, Baby Ruth—7116—. Exhibitors, W. Stewart & Son, Menie, Ont.
3rd. Sir Arthur—8969—; brown and white ; calved April 12th, 1897. Bred by James McCormack & Sons, Rockton, Ont.; sire, Jock Norton—1386—; dam, Teena of Rockton 2nd—2648—. Exhibitor, Andrew H. Nisbet, Troy, Ont.
4th. Neidpath Chief--2142—; mostly white ; calved Aug. 20th, 1896. Bred by Thos. Ballantyne & Son, Stratford, Ont ; sire, Royal Chief 2nd—1716—; dam, Stylish Daisy (imp. in dam)—2037—. Exhibitor, Geo. Hill, Delaware, Ont.

Bull Calf, under one year.

1st. Jock of Hazeldean—9234—; white, with red markings ; calved Aug. 2nd, 1897. Bred by exhibitors ; sire, White Chief of St. Anne's—2036—; dam, Red Rose 3rd—2884—. Exhibitors, W. Stewart & Son, Menie, Ont.
2nd. The Don—8855—; white and brown spotted ; calved October 14th, 1897. Bred by Robert Robertson, Nappan, N.S.; sire, Matchless—7560—; dam, Lady Topsy—8756—. Exhibitor, Daniel Drummond, Petite Cote, Que.
3rd. The Laird—9244—; red and white ; calved Sept. 10th, 1897. Bred by exhibitors ; sire, Jock Morton—1386—; dam, Sensation of Rockton 3rd—2993—. Exhibitors, James McCormack & Sons, Rockton, Ont.
4th. Nonpareil—9031—; dark red and white ; calved Oct. 19th, 1897. Bred by exhibitors ; sire, Surprise of Burnside—2007—; dam, Gurta's Queen—2751—. Exhibitors, W. M. & J. C. Smith, Fairfield Plains, Ont.

Bull Calf, calved after February 1st, 1898.

1st. Rob—9238—; white, with red markings ; calved March 26th, 1898. Bred by exhibitors ; sire, White Prince 2nd (imp. in dam)—808—; dam, Nellie Osborne of Menie—2134—. Exhibitors, W. Stewart & Son, Menie, Ont.
2nd. April Fool of Hickory Hill—9285—; white with brown spots ; calved April 1st, 1898. Bred by exhibitor ; sire, Drummond—2036—; dam, Dandy—2223—. Exhibitor, N. Dyment, Clappison's Corners, Ont.
3rd. Sprightly Lad of Hickory Hill—9286—; white, with brown spots ; calved April 23rd, 1898. Bred by exhibitor ; sire, Drummond—2036—; dam, Bellflower of Hickory Hill—3362—. Exhibitor, N. Dyment, Clappison's Corners, Ont.
4th. Sir Thomas—9247—; brown and white ; calved April 5th, 1898. Bred by exhibitors ; sire, Jock Morton—1386—; dam, Sensation of Rockton 2nd—2649—. Exhibitors, Jas. McCormack & Sons, Rockton, Ont.

Bull of any age.

1st. Napoleon of Auchenbrain (imp.)—8303—(3303). Exhibitor, Robt. Reford, St. Anne de Bellevue, Que.

Cow, 4 years old and upwards.

1st. Lady Nora of Fairfield Mains (imp.)—9186—(11094) ; brown and white ; calved Nov., 1892. Bred by Thos. Howie, Fairfield Mains, Monkton, Scotland. Imported by exhibitor ; sire, Prince of Foulton (3649) ; dam, Fanny of Orangefield (11903). Exhibitor, J. N. Greenshields, Danville, Que.
2nd. Primrose of Holehouse (imp.)—8300—; mixed brown and white ; calved in April, 1894. Bred by Robt. Woodburn, Holehouse, Galston, Ayrshire, Scotland. Imported by exhibitor ; sire, Traveller's Heir of Holehouse (2903). dam, Neikleyard. Exhibitor, R. Reford, St. Anne de Bellevue, Que.
3rd. Jean Armour—2058—; brown and white ; calved Aug. 20th, 1891. Bred by D. Morton & Sons, Hamilton, Ont.; sire, Royal Chief (imp.)—75—; dam, Sprightly (imp.)—1210—(5509). Exhibitors, W. Stewart & Son, Menie, Ont.
4th. Louise of Burnside—7118—; white, with brown on sides of head ; calved Oct. 20th, 1893. Bred by exhibitor ; sire, Silver King (imp.)—5809—, dam, Letty of Burnside—5886—. Exhibitor, D. Drummond, Petite Cote, Que.

Cow, 3 years old.

1st. Sensation of Rockton 4th—2994—; white, with red spots ; calved April 7th, 1895. Bred by exhibitors sire, Jock Morton—1386—; dam, Sensation of Rocton 2nd—2649—. Exhibitors, Jas. McCormack & Sons, Rockton, Ont.
2nd. Fairy of Burnside—8106—; white, with brown spots ; calved May 23rd, 1895. Bred by exhibitor ; sire, Silver King (imp.)—5809—; dam, Mermaid—5207—. Exhibitor, D. Drummond, Petite Cote, Que.
3rd. Moss Rose—2695—; red and white ; calved Dec. 20th, 1894 Bred by exhibitors ; sire, Douglass of London—1384—; dam, Ayrshire Maggie—1972—. Exhibitors, W. Stewart & Son, Menie, Ont.

4th. White Lady of St. Anne's—7630—; white; calved March 15th, 1895. Bred by exhibitor; sire, Glencairn 3rd (imp.)—6955—; dam, white Lass—5661—. Exhibitor, R. Reford, St. Anne de Bellevue, Que.

HEIFER, 2 YEARS OLD.

1st. Queen of St. Anne's. Exhibitor, R. Reford, St. Anne de Bellevue, Que.
2nd. Snowdrop of St. Anne's—7908—; white; calved August 19th, 1895. Bred by exhibitor; sire, Glencairn 3rd (imp.)—6955—; dam, Anne of Barcheskie (imp.)—5357—. Exhibitor, R. Reford, St. Anne de Bellevue, Que.
3rd. Lady Ottawa—3061—; white, with red markings; calved Sept 22nd, 1895. Bred by exhibitors; sire, Dundonald—1718—; dam, Jean Armour—2058—. Exhibitors, W. Stewart & Son, Menie, Ont.
4th. Trim of Burnside—8107—; white, with a little brown; calved December 7th, 1895. Bred by exhibitor; sire, Silver King (imp.)—5809—; dam, Burnside Lass—5890—. Exhibitor, D. Drummond, Petite Cote, Que.

HEIFER, ONE YEAR OLD.

1st. Nellie Osborne of Burnside—8507—; white, a little brown on each side of head; calved Sept. 10th, 1896. Bred by exhibitor; sire, Glencairn of Maple Grove (imp. in dam)—6973—; dam, Nellie Osborne (imp.)—5358—. Exhibitor, D. Drummond, Petite Cote, Que.
2nd. Snowflake—3233—; nearly white; calved Aug. 1st, 1896. Bred by exhibitors; sire, Prince of Barcheskie (imp. in dam)—1656—; dam, Annie Lyle—2388—. Exhibitors, Alex. Hume & Co., Burnbrae, Ont.
3rd. Gem of Rockton—9241—. white, with brown spots; calved Aug. 7th, 1896. Bred by exhibitors; sire, Jock Morton—1386—; dam, Olyllis of Rockton—1109—. Exhibitors, Jas. McCormack & Son, Rockton, Ont.
4th. Exhibitor. J. N. Greenshields, Danville, Que.

HEIFER CALF, UNDER ONE YEAR OLD.

1st. Lillian of St. Anne's—8896—; white, small red spots on head and neck; calved Aug. 16th, 1897. Bred by exhibitor; sire, Glencairn 3rd (imp.)—6955—; dam, Lillie of Williamstown—5660—, Exhibitor Robt. Reford, St. Anne de Bellevue, Que.
2nd. White Princess—9261—; white, with brown on neck and cheeks: calved Aug. 6th, 1897. Bred by exhibitors; sire, White Chief of St. Anne's—2086—; dam, Princess Beatrice—3002—. Exhibitors, Alex. Hume & Co., Burnbrae, Ont.
3rd. Lady Drummond—8851—; white, and few brown spots, mostly on neck; calved Sept. 18th, 1897. Bred by Daniel Drummond, Petite Cote, Que; sire, Glencairn of Maple Grove (imp.)—6973—; dam, Snowflight of Burnside—7114—. Exhibitor, Geo. Hill, Delaware, Ont.
4th. Exhibitor, J. N. Greenshields, Danville, Que.

HEIFER CALF, CALVED AFTER FEB. 1ST, 1898.

1st. Exhibitor, J. N. Greenshields, Danville, Que.
2nd. Miss Sandilands—8934—; brown and white; calved March 3rd, 1898. Bred by exhibitor; sire, Glencairn of Maple Grove (imp.)—6973—; dam, Adela—6175—. Exhibitor, D. Drummond, Petite Cote, Que
3rd. Brownie of Burnside—9369—; brown; calved March 20th, 1898. Bred by exhibitor; sire, Glencairn of Maple Grove (imp.)—1652—6973—; dam, Fanny of Ormstown—4439—. Exhibitor, D. Drummond, Petite Cote, Que.
4th. Barton Princess—9273—; mostly white, with dark brown spots; calved Feb. 3rd, 1898. Bred by exhibitor; sire, Royal Monarch—1941—; dam, Barton Queen—2393—. Exhibitor, J. A. R. Anderson, Hamilton, Ont.

FOUR ANIMALS, THE PROGENY OF ONE BULL, ALL BRED AND OWNED BY EXHIBITOR.

1st. Exhibitor, Robt. Reford, St. Anne. de Bellevue, Que.
2nd. Exhibitor, D. Drummond, Petite Cote. Que.
3rd. Exhibitors, Jas. McCormack & Sonis, Rockton, Ont.
4th. Exhibitor, Robt. Reford, St. Anne de Bellevue, Que.

FOUR CALVES, UNDER 1 YEAR, BRED AND OWNED BY EXHIBITOR.

1st. Exhibitor, Robt. Reford, St. Anne de Bellevue, Que.
2nd. Exhibitors, W. Stewart & Son, Menie, Ont.
3rd. Exhibitor, Daniel Drummond, Petite Cote, Que.
4th. Exhibitors, Alex. Hume & Co., Burnbrae, Ont.

HERD OF 1 BULL AND 4 FEMALES, OVER 1 YEAR OLD, OWNED BY EXHIBITOR.

1st. Exhibitor, Robt. Reford, St. Anne de Bellevue, Que.
2nd. Exhibitor, Daniel Drummond, Petite Cote, Que.
3rd. Exhibitors, W. Stewart & Son, Menie, Ont.
4th. Exhibitor, Robt. Reford, St. Anne de Bellevue, Que.

FEMALE OF ANY AGE.

1st. Lady Nora of Fairfield Mains (imp.)—9186—(11094). Exhibitor, J. N. Greenshields, Danville, Que.

HEREFORD BREEDERS' ASSOCIATION.

ANNUAL MEETING.

Following are the minutes of eighth annual meeting of Hereford Breeders' Association held in Brantford on the 30th of November, 1898.

Members present: A. Rawlings, Geo. Brent, Walter Macdonald, G. de Warren Green, H. G. Wade, J. Stutt, F. A. Fleming, A. Stone, and H. Wade, Secretary.

Mr. A. Rawlings was voted to the chair. The minutes of the last meeting were read and confirmed.

SECRETARY'S REPORT.

This has been a very important year in the history of Hereford cattle; sales have been remarkably good both in Canada and the United States. At the great Armour sale, held in Kansas City on the 25th and 26th of October last, four of the best females sold for $4,025—the imported one, True Lass, bred by the Queen, bringing the top price of $1,025. Two of the bulls also, Shore Acres and Kansas Lass, Jr., bringing $1,000 each; 78 females sold for $30,045, an average of $385.19, and 35 bulls sold for $14,445, or an average of $384.14, or a total of 113 sold for $43,398, or an average of $384.16.

The private sales in Canada have been remarkably good, but I am not able to quote prices, there being no public sales.

In the show ring Herefords have also come to the front in great numbers at every state fair in the Western States and then culminating at Omaha, where they outnumbered any other class of cattle. The American Hereford Cattle Breeders' Association added $3,000 to the meagre prize list of the Exposition Company. The showing of Herefords caused quite an excitement while it lasted, and the decision of the judge, Mr. Claude Mackin, of Florence, Kas., gave great satisfaction.

Herefords at the Industrial Exhibition of 1898 were judged by G. D. W. Green, of Toronto, and Albert Rawlings, Forest. They were not out in large numbers, but the quality and condition of the animals shown were quite up to the high standard. The herds represented were those of D. H. Smith, "Ingleside," Compton, Quebec, and Alfred Stone and the F. W. Stone estate at Guelph. Mr. Smith's cattle were brought out in splendid condition, as usual, showing freshness and bloom without being overdone. The other herds were also in excellent condition, though not so highly finished, and made a very creditable display. Mr. Smith's "Amos of Ingleside," as usual, was given the premier place in the section for bulls over three years. He is a big, useful bull, full of quality, and carries his great weight lightly on strong, straight legs, and is active and fresh looking. The Stone estate came in for second place, with Grandeur, and A. Stone third with Fenndor.

"Ingleside" had no entry in two-year-old bulls, and the Stone estate won first and second. In the section for bulls one year, Mr. Smith's newly-imported bull, Mark Hanna, by Eureka, dam Miss Lark, scored first over Alfred Stone's College Chief, the fine young bull bred at the O. A. C., which won first here as a calf last year, and which had to take second place. Mark Hanna is a typical Hereford of the modern type, being low set, thick-fleshed, level, and full in all points, showing strong breed character, and much quality of flesh and finish. He should do good service in the herd as successor to Amos, Sir Horace, and the other excellent sires which have preceded him. The Stone estate won first and second with bull calves of good quality, Ingleside taking third prize.

Ingleside pitted dam and daughter against each other in the section for cows over four years. It was a close contest and gave the judges considerable perplexity in arriving

at a decision, but the first place was finally conceded to Spot III., the mother, who has held her own famously as a show cow and breeder, while Sylvan III., her daughter, by Pinkham, of Ingleside, is of the same smooth, even type, and full of good flesh.

In three year old cows, Jessie of Ingleside won first over Imp. Duxmoor, of the same herd, who was given second place. Both are good ones, showing strong breeding character, and standing on short legs, having smoothly turned conformation and good handling quality. The Compton herd scored first and second in two-year old heifers, with the two imported heifers, Lady Rupert and Chatterbox, in the order named; the Stone estate coming third, with Graceful 93rd. In yearling heifers, Ingleside scored first with Sylvan 7th, by Sir Horace, and third with Rosa 2nd, the Stone estate winning 2nd with Iona 3rd. The first prize for heifer calf went to the Guelph herd, and second to Ingleside.

Mr. Smith got away with first and second prizes for herd of one bull and four females, the first prize herd being headed by Amos and the second by Mark Hanna. Amos of Ingleside captured the championship for best bull of the breed, and Spot 3rd, of the same herd, the female championship. It is a way they have, thanks to individual merit, based on inheritance, and to the skilful care and preparation given them by Norton, the careful and capable herdsman.

Registrations.—I have recorded 318 Herefords during the last year, 200 females and 118 males, an increase of 109 over 1897, which is very gratifying. We have now 1,445 pedigrees ready for our first volume and 855 missing by means of the fire, so we have made good progress in getting in the missing links. As we have a good balance in the bank, I would ask the directors to let me commence at once to print the first volume. It will require a great deal of work yet to put it in shape, and at the best some of the pedigrees will be incomplete, as we cannot get the description of some of the old animals, but the standard will be correct, as nothing is allowed but what traces to importation on both sides of sire and dam.

Membership.—Seventeen new members have added their names during the past year; these, with the 21 members added in 1896 and 1897, make 38 paid members at the present date. I would advise the meeting to take another call of $2 00 for 1899, giving the members that pay this call the first volume of the Herd Book free. At the present date there is $334.22 on hand, which will pay the expenses of this volume.

The hand of death has also visited our Association during the past year, and we all regret the demise of D. Jackson, of Durham, who, at the time of his death, had probably the largest herd of Herefords in Canada; also in the United States, Mr. George W. Henry, of Chicago, who had been raising Herefords since 1884. He had just purchased two Herefords at the Armour sale for $1,000 each, besides a few at lower prices. These are men to be respected.

I have always thought that our principal Hereford breeders should be more loyal to their own Record and should make a point of recording their animals in Canada, and now, if the first volume is printed, it will add to the feeling of nationality in our Record.

ELECTION OF OFFICERS.

The election of officers then took place, resulting as follows:

President: H. D. Smith, Compton, Quebec.
Vice President for Ontario: Walter Macdonald, Toronto.
Vice-President for Quebec: R H. Pope, Cookshire, Que.
Vice-President for Manitoba: James Shearman, Toddburn, Man.
Vice-President for Nova Scotia: W. W. Black, Amherst, N.S.

Directors: George Brent, Warwick, Ont.; A. Rawlings, Forest; F. A. Fleming, Toronto; John Stutt, Forest; Alf. Stone, Guelph; J. Rigley, Allandale; Isaac Wiser, Prescott; J. Bergen, Cornwall.

Secretary-Treasurer: H. Wade, Toronto.

It was moved by GEORGE BRENT, seconded by G. DEWARREN GREEN, that the secretary be authorized to make a third call of $2.00 membership fee for 1899, and that the first volume of the Hereford Herd book when printed be given to the 1899 and succeeding members free.

It was moved by W. G. BRENT, seconded by G. DEW. GREEN, and agreed, that in view of the satisfactory financial statement of the secretary-treasurer showing sufficient cash on hand to meet the expenses of printing the first volume of the Dominion Hereford Herd book, he be authorized to proceed at once with its publication.

FINANCIAL STATEMENT.

DR.		CR.	
1897, Dec. 1, to cash on hand	$217 14	1898, Dec. 1, by cash com	$ 81 51
1898, Dec. 1, to reg. fees	185 60	Printing and stationery	15 35
17 members, at $2	34 00	Postage	3 08
		Miscellaneous	2 59
		Cash on hand	334 22
	$436 74		$436 74

Nov. 30, 1898.

Read and adopted.

H. WADE,
Treasurer.

HACKNEY HORSE SOCIETY.

ANNUAL MEETING.

Following are the minutes of the seventh annual meeting of the Hackney Horse Society, at the Albion Hotel, February 23rd, 1899, 3 p m.

Present: R. Beith, M.P., in the chair, Messrs. R. Davies, Dr. A. Smith, John Macdonald, H. N. Crossley, Geo. Pepper, Robert Bond, John Holderness, O. Sorby, P. Pollard, and H. Wade, Secretary.

The President in his opening remarks mentioned that the hackney horse in Canada had been a great success, and horse dealers who want a showy harness horse will pay a longer price for one with a cross of hackney on either a thoroughbred or standard bred mare—this makes an ideal for a flashing brougham or for a quieter cob. Farmers have been slow to appreciate this, but are now realizing the fact that hackney horses bring long prices.

SECRETARY'S REPORT.

GENTLEMEN,—I beg leave to present to you the Seventh Annual Report of this society, showing the transactions for the year ending December 31st, 1898.

REGISTRATIONS.—We have recorded 32 pedigrees this year, ten more than last year; we have now 183 on record besides the inspected mares, which makes nearly enough for a volume.

MEMBERS.—Sixteen gentlemen have paid their fees for this year, two more than last year. We gave to the Spring Horse Show $50, and to the Industrial Exhibition $25.

Silver medals were accepted from the English Hackney Society for Canadian-bred stock. The sum of $25 was voted to the Spring Horse Show for best hackney stallion of any age, and $25 for the best mare of any age, sired by a registered hackney stallion, both classes to be shown on the line.

The prize list for hackneys was then considered for the Spring Horse Show.

A vote of thanks was given to R. Beith, M P., for his valuable services as president for the past few years.

I beg leave, as treasurer, to submit the following statement—

Receipts.

1898.	
Jan. 1st, cash on hand	$133 86
Dec. 31st, fees 16 members	80 00
do registration fees (32 pedigrees)	60 00
	$273 86

Expenditure.

1898.	
Dec. 31st, by premiums	$75 00
by printing, postage, stationery, and services	22 15
by commission on 32 pedigrees at 35 cents	11 20
by cash on hand	165 51
	$273 86

Henry Wade, Sec.-Treas.

Examined and found correct,
C. F. Complin, Auditor.
Jan. 23, 1899.

ELECTION OF OFFICERS.

President.....H. N. Crossley, Toronto.
1st Vice-President.....John Macdonald, Toronto.
2nd Vice-President.....Robert Graham, Claremont.

Vice-Presidents for the Provinces.

Ontario.....A. G. Ramsay, Hamilton.
Quebec.....Jas. A. Cochrane, Hillhurst.
Albert.....A. M. Rawlinson, Calgary, Alta.
Manitoba.....Mr. McMillan, Brandon.
New Brunswick.....J. R. Frink, St. John, N.B.

Directors.—Robert Davies, Toronto; Robert Miller, Stouffville; Robert Beith, M.P., Bowmanville: Robert Bond, Toronto; Dr. Andrew Smith, Toronto; O. Sorby, Guelph; John Holderness, Toronto; Geo. Pepper, Toronto; D. B. Simpson, Bowmanville.

Secretary-Treasurer.....H. Wade, Toronto.
Delegate to Industrial Exhibition.....Henry Wade, Toronto.
Delegates to Western Fair, London.....Adam Beck, London. A. G. Bowker, Woodstock.
Delegate to Ottawa.....Robt. Beith, M.P., Bowmanville.
Delegate to Montreal.....Jas. A. Cochrane, Hillhurst, Que.
Delegates to Woodbridge Fair.....John Macdonald, Toronto. John Holderness, Toronto. Robert Bond, Toronto.
Delegates to the Horse Breeders' Association.....Robt. Beith, M.P., Bowmanville. John Macdonald, Toronto.
Auditor.....C. F. Complin, London.

HACKNEYS AT THE TORONTO INDUSTRIAL EXHIBITION.

Stallion, four years old and upwards.

1st. Royal Standard (imp.) 55—(3918); bay, hind feet white, foaled in 1890. Bred by B. H. Lane, Limavady, Ireland; imported by exhibitors: sire, Excelsior (198); dam, Royal Lady (379). Exhibitors, Graham Bros., Claremont, Ont.
2nd. Rosseau Performer (imp.)—34—(5391): chestnut roan; foaled in 1893. Bred by J. T. Browne, Doncaster, Eng.; imported by exhibitors: sire. Enthorpe Performer (2973): dam, Fanny (111), Exhibitor, H. N. Crossley, Rosseau, Ont.
3rd. Courier—26—(1751): bay, foaled in 1887. Bred by C. E. Cooke, Lickham, Swaffham, Norfolk, Eng.; imported by Dr. Seward Webb, Shelburne, Vt.; sire, Canvasser (114): dam, May Day (479). Exhibitors, Graham Bros., Claremont, Ont.

STALLION, THREE YEARS OLD.

1st. Hillhurst Sensation—58— ; bay, little white on off hind heel ; foaled April 30th, 1895. Bred by Hon. M. H. Cochrane, Hillhurst, Que. ; sire, Hayton Shales (imp.)—22—(4806) ; dam, Miss Baker (imp.)—16—(4371). Exhibitor, A. Yeager, Simcoe.
2nd. Squire Rickell—74—264 : chesnut, near hind foot white ; foaled in 1895. Bred by E. W. Twaddell & Sharp, Devon, Pa., U.S. ; sire, Cadet (imp.)—15—107 (1251) ; dam, Miss Rickell (imp.)—14—237 (1248). Exhibitor, R. Beith, M.P., Bowmanville, Ont.

STALLION, TWO YEARS OLD.

1st. Lorenzo—57— ; brown, star on forehead, foaled in May 1896. Bred by R. Beith, M.P., Bowmanville ; sire, Banquo—3— ; dam, Lady Aberdeen (imp.)—5—(5482). Exhibitor, Ottawa Live Stock Improvement Co., Ottawa. Ont.

YEABLING COLT, ENTIRE.

1st. Rosseau Swell—71— : roan ; foaled June 12th, 1897. Bred by exhibitor ; sire, Royal Standard (imp.) —55—(3918) ; dam, Althorpe Countess (imp.)—20—(6357). Exhibitor, H. N. Crossley, Rosseau, Ont.
2nd. Hortensio—69— ; bay, fore foot and both hind feet white ; foaled April, 1897. Bred by exhibitor ; sire, Jubilee Chief (imp.)—1—(2122) ; dam, Mona's Queen (imp.)—4—(5887). Exhibitor, R. Beith, M.P., Bowmanville, Ont.

STALLION, ANY AGE.

1st. The Royal Standard (imp.) —55—. Exhibitors, Graham Bros., Claremont, Ont.

FILLY, THREE YEARS OLD.

1st. Cassandra—83— ; brown, star and two white feet ; foaled Sept. 1st, 1895. Bred by exhibitor ; sire, Jubilee Chief—1—(2122) ; dam, Mona's Queen (imp.)—4—5887. Exhibitor, R. Beith, M.P., Bowmanville, Ont.
2nd. Winsome—49— ; bay, fore feet and off hind leg white ; foaled May 9th, 1895. Bred by A. G. Ramsay, Mount Albion, Ont. ; sire, Courier (imp.) [26] (1751) , dam, [Kathleen—13—F.S.]. Exhibitor, M. G. Lottridge, Hamilton, Ont.
3rd. Trilby—50— ; brown, star on forehead, off hind pastern white ; foaled May 22nd, 1895. Bred by A. G. Ramsay, Mount Albion, Ont., sire, Courier (imp.)—26—(1751) ; dam, [Topsy—10—F.S.]. Exhibitor, M. G. Lottridge, Hamilton. Ont.

FILLY, TWO YEARS OLD.

1st. Rosseau Filimore—55— ; brown ; foaled May 1896. Bred by H. N. Crossley, Rosseau, Ont. ; sire, Fireworks (imp.)—16—(3602) ; dam, [Surefoot—4—F.S.]. Exhibitor, A. Gooderham, Toronto.

2nd. Bianco—76— ; chestnut, white star, one fore and two hind feet white ; foaled June, 1896. Bred by exhibitor ; sire, Seagull—8—(2261) : dam, Cherry Ripe—70—567. Exhibitor, R. Beith, M. P., Bowmanville, Ont.

YEARLING FILLY.

1st. Cordelia—85— ; chestnut, dark points ; foaled in 1897. Bred by exhibitor ; sire, Banquo—3—162 ; dam, Florence - (imp.)—3—354 (661). Exhibitor, R. Beith, M.P., Bowmanville, Ont.
2nd, Miss Roberta—78— ; dark bay, near hind foot and ankle white, star on forehead and snip on nose ; foaled April 25th, 1897. Bred by exhibitor ; sire, Rosseau Performer (imp.)—34—(5391) ; dam, Lady Bird (imp.)—15—(5510). Exhibitor, H. N. Crossley, Rosseau, Ont.
3rd. Rosseau Jewel—79— ; brown roan, white star on forehead ; foaled May 18th, 1897. Bred by exhibitor ; sire, Rosseau Performer (imp.)—34—(5391) ; dam, [Surefoot—4—F.S.]. Exhibitor, H. N. Crossley, Rosseau, Ont.

BROOD MARE, WITH FOAL OF THE SAME BREED BY HER SIDE.

1st. Lady Bird (imp.)—15—(5510) ; black, few white hairs on face, nigh hind foot white ; foaled in 1889. Bred by T. Watkinson, The Grange, Holme, Yorkshire, Eng. ; imported by exhibitor ; sire, Superior (1410) ; dam, Jessie, by Confidence (1265). Exhibitor, H. N. Crossley, Rosseau, Ont.
2nd. Lady Aberdeen (imp.)—5—(5482) ; brown, foaled May, 1890. Bred by Wm. Martin, Scoreby Grange, Yorkshire, Eng. ; imported by Robert Kerr, Raeburn, Man. ; sire, Lord Derwent 2nd (1034) ; dam, Florence (imp.) —3—(661). Exhibitor, R Beith, M.P., Bowmanville, Ont.
3rd. Mona's Queen (imp)—4—(5887) : chestnut, star on face, front feet and near hind foot white ; foaled in 1889. Bred by Wm. Martin, Scoreby Grange, Yorkshire, Eng. ; imported by Robt. Kerr, Raeburn, Man. ; sire, Lord Derwent 2nd (1034) ; dam, Mayflower (imp.)—2—(767). Exhibitor, R. Beith, M.P., Bowmanville, Ont.

FOAL OF 1898.

1st. Sylvia—89— ; bay ; foaled in 1898. Bred by exhibitor ; sire, Jubilee Chief (imp.)—1—108 (2122) ; dam, Mona's Queen (imp.)—4—(5887). Exhibitor, R. Beith, M.P., Bowmanville, Ont.
2nd. Rosseau St. George—75— ; bay, black points ; foaled April 23rd, 1898. Bred by exhibitor ; sire, Rosseau Performer (imp.)—34—(5391) ; dam, Lady Bird (imp.)—15—(5510). Exhibitor, H. N. Crossley, Rosseau, Ont.
3rd. Lord Aberdeen—76— ; chestnut ; foaled May 9th, 1898. Bred by exhibitor ; sire, Rosseau Performer (imp.)—34—(5391) ; dam, Rosseau Birdie—47—. Exhibitor, H. N. Crossley, Rosseau, Ont.

SINGLE HORSE, MARE OR GELDING, NOT MORE THAN 15¾ HANDS.

1st. Jessica—25—663; brown, star on forehead, four white feet; foaled April 10th, 1894. Bred by exhibitor; sire, Jubilee Chief (imp.)—1—(2122); dam. Mona's Queen (imp.)—4—(5887). Exhibitor, R. Beith, M.P., Bowmanville, Ont.

BEST MARE OF ANY AGE.

1st. Jessica—25—663. Exhibitor, R. Beith, M. P., Bowmanville, Ont.

SPECIALS FOR HACKNEYS.

BEST HACKNEY, ANY AGE, PRESENTED BY JOHN HOLDERNESS, TORONTO.

1st. Royal Standard (imp.)—55—(3918). Exhibitors, Graham Bros., Claremont, Ont.

BEST HACKNEY OR PONY MARE, FILLY OR FILLY FOAL, REGISTERED OR ELIGIBLE FOR REGISTRATION IN THE ENGLISH HACKNEY STUD BOOK, GIVEN BY ENGLISH HACKNEY HORSE SOCIETY.

1st. Lady Bird (imp.)—15—(5510). Exhibitor, H. N. Crossley, Rosseau, Ont.

BEST HACKNEY OR PONY STALLION, ENTIRE COLT OR COLT FOAL, REGISTERED OR ELIGIBLE FOR REGISTRATION IN THE ENGLISH HACKNEY STUD BOOK, GIVEN BY ENGLISH HACKNEY HORSE SOCIETY.

1st. Royal Standard (imp.)—55—(3918). Exhibitors, Graham Bros., Claremont, Ont.

BEST HACKNEY STALLION, MARE OR GELDING 6 YEARS OLD OR UNDER, BY A REGISTERED HACKNEY STALLION AND OUT OF A REGISTERED OR UNREGISTERED MARE, TO BE SHOWN IN HARNESS BEFORE A TWO-WHEELED SUITABLE VEHICLE, GIVEN BY AMERICAN HACKNEY HORSE SOCIETY.

1st. Exhibitor, T. A. Crow, Toronto.

BEST HACKNEY STALLION, MARE OR GELDING, 6 YEARS OLD OR UNDER, BY A REGISTERED HACKNEY STALLION AND OUT OF A REGISTERED OR UNREGISTERED MARE, TO BE SHOWN UNDER SADDLE, GIVEN BY AMERICAN HACKNEY HORSE SOCIETY.

1st. Exhibitor, T. A. Crow, Toronto.

CLYDESDALE HORSE BREEDERS' ASSOCIATION.

LIST OF MEMBERS FOR 1899.

Agur, Amos ..... Marshville.
Algar & Co., F. E ..... Pomoka, Alta.
Barbour, T. F ..... Hillsburg.
Bell, A. & J ..... Athelstane, Que.
Bell, John ..... Amber.
Bennett, D ..... Dutton.
Berwetheck, W ..... Hagersville.
Brady, Thos ..... Chatham
Butler & Son, Wm ..... Dereham Centre.

Carlyle, Thos. ..... Chesterfield.
Charlton, E. W ..... Duncrief.
Clark, And. W ..... Seneca, Kas., U. S.
Colquhoun, W ..... Mitchell.
Cook, Jas ..... Myrtle.
Corbett, Thos ..... Malton.

Davidson, John ..... Ashburn.
Davidson, Jas. I ..... Balsam.
Davidson & Son, Peter ..... Nichol.
Devitt & Son, Isaac ..... Freeman.
Dickson, Wm ..... Atwood.
Doherty, A ..... Ellesmere.
Duncan, David ..... Hagerman's Corners.

Eadey, Wm ..... Vars.

Ficht, Valentine ..... Oriel.

Graham Bros ..... Claremont.
Gray, John ..... Atwood.
Greenlees, Hugh ..... Bowmanville.

Hartin, Wm H ..... Twin Elm.
Hamilton, R ..... Ridgetown.
Hazlewood, Jas ..... Kirkton.
Henderson, J ..... Belton.
Hendrie & Co., Wm ..... Toronto.
Hepburn, Wm ..... Foley.
Hodgkinson, T. D ..... Beaverton.
Howard, W J ..... Dollar.
Hummerson, Ira ..... Foley.

Irving, W. Bell ..... Mitford, Alta.
Isaac, Geo ..... Bowmanton.
Isaac, John ..... Markham.

Johnston, And ..... Oak Lake, Man.

Kelly, R. S ..... Calgary, Alta.
Klock & Co., R. H ..... Klock's Mills.

Laycock, Wm ..... Calgary, Alta.
Leaitch, Richard ..... Palmerston.
Lowes, John W ..... Bethany.

Macfarlane, J. M ..... Baljennie, Sask.
Marshall, Jas ..... Pine Grove.
Miller, R ..... Stouffville.
Morrison, Dugald ..... Argyle.
Mutch, A. & G ..... Lumsden, Assa.

McBeth, Donald ..... Oak Lake, Man.
McCrae, D ..... Guelph.
McDonald, A. H ..... Oxbow, Assa.
McEwen, D ..... Ormstown, Que.
McGeachey, J. & R ..... Castlemore.
McGerrigle, S. & D ..... Ormstown, Que.
McHugan, A. D ..... Rodney.
McKay Milling Co ..... Ottawa.
McLean, Samuel ..... Franklin, Man.
McMurchie, John ..... Erie.
McMillan, Geo ..... Mildmay.
McRoberts, J. H ..... Robinson, Ill. U. S.

Ness, Robert ..... Howick, Que.

Paton, Hugh ..... Shedden Cartage Co. Montreal.
Pingle, Alex ..... Unionville.
Prouse, S. J ..... Ingersoll.
Pryce, Fred ..... Carstairs, Alta.

Robinson, Mrs. J. W ..... St. Mary's.
Robertson, Thos. W ..... High River, Alta.
Ross, Bros ..... Nairn.
Ross, jr., John C ..... Jarvis.
Ross, Jas ..... Inverhaugh.
Rusnell, Francis ..... Sebringville.
Russell, R ..... Ballinafad.
Russell, Thos ..... Exeter.

Scott, Hugh ..... Caledonia.
Shattuck, W. D ..... Davisburg, Alta.
Sheppard, J. A ..... Belhaven.
Skinner, Thos ..... Mitchell.
Skinner, Josiah ..... Munro.
Smith, Neil ..... Brampton.
Smith, W. T ..... Glenboro, Man.
Smith, John E ..... Brandon, Man.
Sorby, D. & O ..... Guelph.
South Cayuga Draught Horse Association ..... South Cayuga.
Symmer, T. W. & E ..... Aylmer, Que.

Taylor, Thos ..... Harwich.
Thomson, Robert ..... Bright.
Turner, John A ..... Millarville, Alta.
Turner, Robert ..... Millarville, Alta.

VanHorne, Sir Wm ..... Montreal.
Vipond, John ..... Brooklin.

Wallace, Geo. A ..... Ponsonby.
Watt, J. & W. B ..... Salem.
Watts, Thos ..... Mount Albert.
White, A. T ..... Pembroke.
Wilkie, Wm ..... Toronto.
Wilkinson, Lieut.-General ..... Birtle, Man.
Wood, R. Shaw ..... London.

CLYDESDALE HORSE BREEDERS' ASSOCIATION.

ANNUAL MEETING.

The thirteenth annual meeting convened in the Albion Hotel on Thursday, the 9th of February, 1899, at 2 p.m.

The following members were present: President, Robert Davies, in the chair; H. N. Crossley, Toronto; R. Beith, M.P., Bowmanville; D. B. Simpson, Bowmanville; John Vipond, Brooklin; Geo. Cockburn, Baltimore; Jas. Snell, Clinton; W. J. Howard, Dollar; Jas. Henderson, Belton; D. Sorby, Guelph; J. C. Snell. London; A. Doherty, Ellesmere; Richard Gibson, Delaware; Arthur Johnston, Greenwood; Robert Graham, Claremont; Peter Christie, Manchester; A. Innes, Clinton, and H. Wade, Secretary, Toronto.

The Secretary was then called upon to read his annual report, and it was moved by Jas. Henderson, seconded by John Davidson, that the minutes of the last annual meeting be taken as read and that the report be adopted. Carried.

PRESIDENT'S ADDRESS.

By R. Davies, Toronto, Ont.

Once more we have the pleasure of holding our annual meeting, to transact our routine business, and discuss the future prospects and business outlook of the Clydesdale Horse Association.

As your President I may not have anything very new to present to you, but can safely congratulate you on the present condition of the horse market. The demand, though not brisk, is certain—like everything else, the superior article always finds a profitable sale. We have ever to raise our standard higher, ; we must not be content on arriving at one point of excellence, but strive for one still higher, which time and the advancing condition of everything amongst which we live clearly demonstrate that the Clydesdale breeders must not lag in the race for superiority. But, I repeat, we must continue to improve, and keep a bright outlook for anything that will advance our interests.

One quality most in demand is size—the horse wanted for the future must be big. Our efforts as breeders should be mainly along that line; we must have great size with sufficient bone to carry weight without coarseness. The demand for animals of this kind is sure. Animals of fine size and appearance always command good prices over average stock, apart from any other of the necessary qualities of the animal. I thi k we are fully justified in assuming that there will be a steady market for many years to come for our horses, aside from any great demand for shipping to foreign countries.

We can, and wisely, I think, expect from the rapid development of our mineral industries, the building of new railways, and other works of like magnitude, the large influx of agricultural immigrants and the consequent settling of new districts of the country in all directions. The large investments of capital on every hand in various enterprises, all go to mark an assured era of prosperity, which will benefit everyone, and none more so, I hope, than the members of this Association. I speak in this hopeful way, gentlemen, because I am sanguine, and I am satisfied that we are passed the seven lean years, and have entered now the enjoyment of the seven fat ones.

It is needless for me to point out to you, practical men, the necessity of carefulness in breeding, but I do mention to be particular in your importations. See that you get quality in the sires. Consider the animal first, and the price afterwards, and the result cannot but be satisfactory along the lines indicated, when mated with the proper mares.

From our Secretary-Treasurer's report you will learn that our finances are in good shape, and that the balance is on the right side, and also that there has been a most gratifying increase of members over previous years, but we hope that this membership will still increase, as much benefit is to be derived from this meeting together, and the exchanging of ideas and experiences, and in the promotion of social and business acquaintance.

REPORT OF THE SECRETARY-TREASURER.

I beg leave to present to you the thirteenth annual report of this Association, stating the business done for the Association during the last year.

I am glad to be able to state that there has been a decided improvement in matters affecting Clydesdale interests. The lack of attention and general indifference to horse breeding which has prevailed so long in the country has now given way to a better state of affairs. With the improved demand for heavy horses has come a renewal of importations of breeding stock from the old country, and that, not of single animals, as has of late years been the case, but one importer has brought out as many as eleven. Among those who have thus introduced new blood into the country have been Messrs. John Isaac, Markham; Dalgetty Bros, Dundee, Scotland, and Glencoe, Ont., and Arthur Johnston, Greenwood.

There has also been a considerable movement of Clydesdales from Ontario to points in the Northwest for breeding purposes. Mr. John A. Turner, Millarville, Alta., has taken nine head from Messrs. Sorby, Guelph, and Mr. Chas. Michie, Pavina, Alta., has been another purchaser.

Altogether, prospects for Clydesdale breeders are bright. There is a great scarcity of good young heavy horses, two and three years old. Really good stock finds a ready market in the old country. In this connection it should be remembered they must be big to suit old country tastes. In Scotland they are now being produced on larger lines than formerly, but, at the same time, bone of clean quality is not being lost sight of.

The Clydesdale geldings that have been shown at the leading Shows in 1898 in Scotland are far ahead of those brought out some three or four years ago, and the classes are now as keenly contested as those for pure-bred breeding stock. Prices paid for big, sound two-year-old geldings have ranged from £45 to £70. This should be a good field for our breeders to enter.

Registrations.—We have recorded 252 Clydesdales this year, against 99 last year, an increase of 151, which is very satisfactory, and appearances are that the coming year will be more satisfactory still.

Members.—The increase of from 29 members in 1897 to 69 paid members for 1898 is also gratifying, and shows that the lowering of the fee from $3 to $2 per annum was a move in the right direction.

Stud Book.—The IX Volume was printed during the last year and sent out to all members to whom it was due. It contains the pedigrees of 445 Clydesdales in the book proper and 75 in the Clydesdale Appendix. From all appearances it will not be long before we have pedigrees enough to print Vol. X.

FINANCIAL STATEMENT FOR YEAR ENDING DECEMBER 31, 1898.

Receipts.		*Expenditures.*	
1898.		1898.	
Jan. To cash on hand	$147 57	Dec. 31. By insurance on books	$15 00
69 members' fees @ $2.00	138 00	printing and stationery	26 50
Registration fees—		postage and telegrams	10 20
251 peds., 24 certs	277 75	stenographer, etc.	11 00
		com. on 251 peds. @ 35c $87 85	
		com. on 24 certs. @ 15c 3 60—	91 45
		printing and binding Vol. 9	315 00
		balance on hand	94 17
	$563 32		$563 32

Assets.		*Liabilities.*	
Cash on hand	$94 17	Balance brought forward	$3,126 17
2,220 unbound Vols. @ $1	2,220 00		
400 bound do	400 00		
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ELECTION OF OFFICERS.

Before the election of officers took place Mr. Robert Davies, in a few well-chosen remarks, thanked the members present for their hearty support during his term of office, but declined to act as President any longer as he thought each member should have a chance to fill this important office. He also congratulated the members of the Association on the good showing that had been made this year over last in regard to membership, and believed it would continue to increase, as horsemen were just emerging from a long period of depression and on the eve of prosperity. He then called upon the Secretary to take the chair, and the members to proceed with the election of officers.

President: Peter Christie, Manchester.
First Vice-President: John Davidson, Ashburn.
Vice-President for Ontario: Douglas Sorby, Guelph.
Vice-President for Quebec: Robert Ness, Howick, Que.
Vice-President for Manitoba: J. E. Smith, Brandon, Man.
Vice-Presidents for N.W. Territories: John A. Turner, Calgary, Alta., and J. A. McFarlane, Saskatchewan.

Directors.

Robert Beith, M.P., Bowmanville; Robert Davies, Toronto; Geo. Cockburn, Baltimore; A. Innes, Clinton; John Vipond, Brooklin; Robert Graham, Claremont; Alex. Doherty, Ellesmere.

Delegates to Industrial Exhibition: Peter Christie, Manchester; John Davidson, Ashburn.

Delegates to Western Fair: A. Innes, Clinton; J. Henderson, Belton.

Delegates to Ottawa Exhibition: Robert Davies, Toronto; Robert Beith, M.P., Bowmanville.

Delegate to Montreal: R. Ness, Howick, Que.

Delegates to Horse Breeders' Association: Robert Davies, Toronto; Robert Graham, Claremont.

After a little discussion on the one judge system, it was moved by Robert Davies, seconded by A. Innes, "That our recommendation to the Industrial Exhibition Association be one expert judge." Carried unanimously.

Judges suggested to select from for Industrial: R. Ness, Howick, Que.; A. Innes, Clinton; Alex. Galbraith, Janesville, Wis.

Suggested to select from for Spring Show. Geo. Gray, Newcastle; E W. Charlton, Duncrief; Jas. McMillan, Seaforth.

Auditor: F. C Complin, London.

At this juncture the Secretary explained to the members present that a resolution on the same lines as that which he was now about to read had been passed by the Shorthorn Breeders at their annual meeting, and he thought it would be wise for this Association to do the same in order to bring all the influence possible to bear on the American authorities that we might get our Clydesdale certificates recognized at the lines, as they were of as high a standard as the American certificates.

It was then resolved, "That whereas this Association has learned that purchasers of Clydesdale horses for exportation to the United States are put to much inconvenience and delay in shipment because of the necessity under present regulations of registering in the

American Stud Book in order to pass the Customs ; therefore resolved that : "inasmuch as the standard of the Clydesdale Association is precisely the same as that of the American Record, and that such horses to be useful in the United States must, in the end, be recorded there, this meeting is of the opinion that every interest would be subserved and properly protected by admitting Clydesdales on presentation to the customs authorities of properly accepted certificates of registration signed by the Registrar under the control of the Department of Agriculture of Ontario, Canada And resolved further: that a Committee consisting of Robert Davies, Toronto; Robert Beith, M.P. and H. Wade, Secretary, be hereby appointed to enlist the co-operation of the American Clydesdale Association in presenting this view to the proper authorities at Washington." Carried unanimously.

Moved by ROBERT DAVIES, seconded by A. INNES, "That if we hold a Spring Horse Show one expert judge be selected from the list already given to judge Clydesdales."

At this period of the meeting a short discussion took place as to whether it would be advisable to donate any of the funds of the Association towards giving a prize at the Spring Show, if such Show was held. After due consideration it was thought that the Association could afford $50, seeing that all their obligations had been met and they still had a balance to the good.

It was therefore moved by ROBERT DAVIES, seconded by ROBERT BEITH, M.P., "That in case there be a Spring Horse Show the sum of $50 be donated from this Association."

The question then came up as to what this sum should be given to, and after short deliberation upon the subject by the members, it was moved by ROBERT BEITH, seconded by JAS. HENDERSON, "That the prize donated by the Clydesdale Association to be given at the Spring Show be awarded to the best pair of draught horses got from a registered Clydesdale Stallion." Carried unanimously.

Mr. ARTHUR JOHNSTON, of Greenwood, then said he had a matter of importance to bring up which was of great interest to the horsemen of this country, and he wished to have the Clydesdale Breeders pass a resolution appointing a committee to interview the Railway Transportation Committee to urge upon them the necessity of allowing pure-bred horses to be shipped at a reduced rate, the same as the cattle and swine are now, upon producing a pedigree from one of our recognized Herd or Swine books. He stated when he arrived at Montreal a year ago with two colts they could not be shipped at half rates, while all other sorts of stock carried at half rates provided you furnish a certificate from some of the recognized Herd Books. He had to pay for the colt for 4,000 lbs., whereas he brought a bull that weighed twice as much and simply had to pay for 1,000 lbs. He thought this Association should take energetic measures to bring it to the attention of the railway authorities, as there is no reason in the world why pure bred horses should not be shipped at reduced rates the same as cattle.

Moved by JAS. HENDERSON, seconded by D. SORBY, "That a Committee consisting of Robert Davies, Robert Beith, M P., and H. Wade be a Committee appointed to wait on the Railway Transportation Committee in order to get them to agree to allow Clydesdales registered in the Canadian Record to be shipped at reduced rates on presentation of certificate from said book, the same privilege as the Cattle Breeders' Association now have." Carried.

CLYDESDALES AT THE TORONTO INDUSTRIAL EXHIBITION, 1898.

The following are the prize-winners in the Clydesdale classes at the Industrial Exhibition, Toronto August 29th to September 10th, 1898.

STALLION AND FOUR OF HIS PROGENY, THE PROGENY NOT TO BE OVER 2 YEARS OLD.

1st. Young Macqueen [2290], bay, four white feet and stripe on face; foaled in 1894. Bred by R. B Ogilvie, Madison, Wis.; sire Macqueen [imp.] [462] (5200); dam, Belle of the Lyons (imp.) [2325] 3511. Exhibitor, Richmond Hill Horse Breeders' Association, Richmond Hill.

STALLION, FOUR YEARS OLD AND UPWARDS.

1st. Simon Yet [2390] 6895, chestnut, white face, hind legs white to hock, white forepasterns; foaled May 25th, 1892. Bred by R. B. Ogilvie, Madison, Wis.; sire, Macqueen [462] (5200); dam, Meg Merrilies [194] 4067. Exhibitors, Graham Bros., Claremont.
2nd. King's Own [2172], brown, off hind foot white; foaled May, 1896. Bred by exhibitor; sire, Queen's Own (imp.) [1708] (7176); dam, Candour (imp.) [1656]. Exhibitor, Robert Davies, Toronto.
3rd. Just the Thing (imp.) [1248] (7860), dark brown, stripe on face, white hind legs; foaled June, 1887. Bred by Wm. Woodrow, Pennilee, Kilbarchany, Scotland. Imported by exhibitor; sire, Jordanshaw (3343); dam, Bell, by Lays Jock (444). Exhibitor, W. Taylor, Cannington.
4th. Two in One [2383] 8032, bay, white face, four white legs, foaled in 1894. Bred by R. B. Ogilvie, Madison, Wis.; sire, Marmion (imp.) [539] 6074; dam, Lass O'Gowrie 3rd [2461] 5544. Exhibitors, Graham Bros., Claremont.

STALLION, THREE YEARS OLD.

1st. MacMicking (imp.) [2395], bay, white face, white hind legs, foaled in 1895. Bred by James Craig, Camp Douglas, Castle Douglas, Scotland; imported by Wm. Colquhoun, Mitchell, Ont.; sir, MacMackan (9600); dam, Bet of Camp Douglas (2083). Exhibitors, Dow & Colquhoun, Mitchell.
2nd. Border Riever (imp.) [2307], brown, star on face, near fore foot, off hind leg and near hind foot white; foaled May, 1895. Bred by Lord Polwarth, St. Boswells, Scotland; imported by exhibitor; sire, Prince of Millfield (9650); dam, Connie Nairn (11569). Exhibitor, Robert Davies, Toronto.
3rd. Black Prince [2249], black; foaled May, 1895. Bred by Robert Davies, Toronto; sire, Queen's Own (imp.) [1708] (7176); dam, Candour (imp.) [1656]. Exhibitors, Bennett Bros., Uxbridge.
4th. Right of Way (imp.) [2397] (10426), brown, broken white stripe on face, near hind leg white; foaled May, 1895. Bred by Wm. McConnell, Glanwick, Kirkcowan, Scotland. Imported by Wm. Colquhoun, Mitchell, Ont; sire, Prince of Gallway (8919); dam, Jenny Rae (7518), Exhibitors, Dow & Colquhoun, Mitchell.

STALLION, TWO YEARS OLD.

1st. Lyon Macgregor (imp.) [2308] (10376), brown, stripe on face, hind legs white; foaled April 18th, 1896. Bred by Stephen Hunter, Whiteleys, Stranraer, Scotland. Imported by exhibitor; sire, Macgrego (1487); dam, Olivette (12797) Exhibitor, Robert Davies, Toronto.
2nd. Prince of the Border (imp.) [2394] (10417), bay, white face, near fore leg and hind legs white; foaled April 23rd, 1896. Bred by Lord Polwarth, Mertoun House, St. Boswells, Scotland. Imported by Peter McGregor, Brucefield, Ont.; sire, Prince Alexander (8899); dam, Jess of Blackbyers (7728). Exhibitors, McGregor & Honey, Brucefield.
3rd. Tom Macgregor (imp.) [2313], bay, stripe on face, hind legs white below hocks, hind feet white; foaled May 1st, 1896. Bred by James McLean, Auchneil, Stranraer, Scotland. Imported by exhibitor; sire, Macgregor (1487); dam, Jennie Bell (2595). Exhibitor, Robert Davies, Toronto.
4th. Polonius (imp.) [2309], brown, stripe on face, hind legs white, foaled May 26th, 1896. Bred by Stephen Hunter, Stranraer, Scotland. Imported by exhibitor; sire, Macgregor, (1487); dam, Ophelia (12508). Exhibitor, Robert Davies, Toronto.

YEARLING COLT, ENTIRE.

1st. Prince of the Glen [2306], bay, blaze on face, nigh hind leg white; foaled March 21st, 1897. Bred by exhibitor; sire, Prince of Quality [2173]; dam, Edith (imp.) [1322]. Exhibitor, Robert Davies, Toronto.
2nd. Roslin Again [2497], bay, stripe on face, hind feet white; foaled April 7th, 1897. Bred by exhibitor; sire, Roslin (imp.) [2124] (9839); dam, Harland's Queen [2551]. Exhibitor, S. J. Prouse, Ingersoll.
3rd. Prince of Hurlford (imp.) [2396], dark brown, white face, dark points, white spot on near hind foot; foaled April 24th, 1897. Bred by Wm. Young, Hurlford, Ayrshire, Scotland. Imported by William Colquhoun, Mitchell, Ont.; sire, Prince Alexander (8899); dam, Mary Ann (12977). Exhibitors, Dow & Colquhoun, Mitchell.

STALLION, ANY AGE.

1st. Simon Yet [2390]. Exhibitors, Graham Bros., Claremont.

FILLY, THREE YEARS OLD.

1st. Maggie [2349], bay, white stripe on face, two hind ankles white; foaled May 25th, 1895. Bred by exhibitor; sire, Energy (imp.) [1432] 7486 (7691); dam, Edith (imp.) [1322]. Exhibitor, Robert Davies, Toronto.

YEARLING FILLY OR GELDING.

1st. Royal Princess [2345], brown, stripe on face, black points; foaled April 16th, 1897. Bred by exhibitors; sire, The Royal Standard (imp.) [2220] (10014); dam, Corinne [2226]. Exhibitors, Graham Bros., Claremont.

BROOD MARE WITH FOAL OF SAME BREED BY HER SIDE.

1st. Edith (imp.) [1322], brown, star on forehead, little white on hind feet; foaled, May, 1888. Bred by John Mark, Stow, Scotland Imported by Graham Bros., Claremont; sire, Lord Lynedoch (4530); dam, Rorie of Roryette (9547) Exhibitor, Robert Davies, Toronto.
2nd. Nelly (imp.) [1326], bay, stripe on face, hind legs white; foaled April, 1891 Bred by L. D. Gordon Duff, Drummuir, Scotland. Imported by Graham Bros., Claremont; sire, Lord Montrose (7973); dam, Pride of Drummuir (imp.) [1325]. Exhibitor, Robert Davies, Toronto.
3rd. Nelly [970], brown, white patch on face; foaled April 27th, 1886. Bred by Jasper Howat, Halbarns, Kilmarnock, Ayrshire, Scotland. Imported by exhibitors; sire, Laird of Bute (4490); dam, Maggie of Hallbarns (7352) Exhibitors, Graham Bros., Claremont.

FOAL OF 1898.

1st. Prince Lynedoch [2381], bay, stripe on face, off fore foot and two hind legs white; foaled April 16th, 1898. Bred by exhibitor; sire, Prince of Quality [2173] 5648; dam, Edith (imp.) [1322]. Exhibitor, Robert Davies, Toronto.
2nd. Scottish Prince [2384], bay, stripe on face, one white hind foot; foaled April 29th, 1898. Bred by exhibitors; sire, Young Macqueen [2290]; dam, Nelly (imp.) [970] 7422. Exhibitors, Graham Bros., Claremont.
3rd. King Lynedoch [2378], bay, star on forehead, hind legs white; foaled March 26th, 1898. Bred by exhibitor; sire, King's Own [2172]; dam, Nelly (imp.) [1323]. Exhibitor, Robert Davies, Toronto.

MARE WITH TWO OF HER PROGENY.

1st. Edith (imp.) [1322]. Exhibitor, Robert Davies, Toronto.

SPAN OF GELDINGS OR MARES.

1st. Exhibitor, Alex. Wild, Toronto.
2nd. Exhibitor, Alex. Wild, Toronto.

BEST MARE OF ANY AGE.

1st. Edith (imp.) [1322]. Exhibitor, Robert Davies, Toronto.

SHIRE HORSE BREEDERS' ASSOCIATION.

The tenth annual meeting of this Society was held in Toronto on February 9th; 1899. Present: H. N. Crossley, Rosseau; John Gardhouse, Highfield; John Davidson, Ashburn; Wm. Linton, Aurora; Wm. Snell, Clinton; W. E. Wellington, Toronto, P. Boynton, Dollar; Jas. Leask, Taunton; A. Johnston, Greenwood; J. M. Gardhouse, Highfield and H. Wade, Secretary.

Minutes of last meeting read and confirmed.

As foreshadowed last year, we have had rather better results this year in the way of registrations and membership fees, but there is still room for progress. Heavy horses are more in demand, so breeders need not be afraid to launch out again a little.

FINANCIAL STATEMENT.

Receipts.		Expenditure.	
1898.		1898.	
To balance brought forward	$30 68	Dec. 31, By postage and stationery	$3 10
" fees, registering 23 pedigrees and one certificate	27 50	" English Stud Books	12 20
Fees, 9 members at $2.00	18 00	Commission 23 peds. @ 35 and 1 cert. @ 15	8 20
		Balance on hand	52 68
	$76 18		$76 18

I hereby certify that I have examined the books of the Shire Horse Breeders' Association, and that the above statement is in accordance therewith.

Toronto, Jan. 23, 1899.

(Sgd.) Chas. Complin,
Auditor.

PRESIDENT'S ADDRESS.

By Horace N. Crossley, President.

Since the year 1896, when the members of this Association thought fit to raise me to the position of President of the Society, I have carefully studied the prospects of the Shire horse in this and in other countries. It will be remembered by all that 1896 was one of the blackest and most gloomy years for the horse industry which the horse breeders of this Canada of ours have ever had to face. The Shire Horse Society itself appeared to be almost doomed.

As year has succeeded year however, the heavy cloud which spread over us, which obscured and almost obliterated both the horse breeding industry and our Society, has been gradually lifting and already displays before us some of its silver linings.

From enquiries made of all breeders it would appear that good heavy draught horses, during last year, had more to do than it was right to expect them to do faithfully, well and with satisfactory results. One remarkable fact struck me at the last Industrial Exhibition, namely, that every aged Shire horse entered (and for once, our entries exceeded those of the Clydes in numbers) had covered over one hundred mares.

If I read this sign correctly, there must be a largely increased demand throughout the country for the service of good stallions, and farmers in general forsee the day when the prices at least of a good heavy draught horses will repay them handsomely for an outlay of care and money—an outlay which will require not less than four years to mature to a profit. Further, I construe the above facts to mean, that a much larger importation of Shire horses is sure to take place during the coming year than has been the case during the last four years.

Firstly, I make this assertion, because the requirement of the times warrants this importation, the present stock of stud horses having more to do than it can do. Secondly, because, as we stud horse men know to our cost, it is in accordance with the spirit of enterprise displayed by Canadians, that when one man is making a fair return for his money another man thinks that he can do as much in the same line of business, often causing disastrous results to both.

If prospective investors would only carefully consider the conditions of the locality, before rushing in "where angels fear to tread," and a man ought to be almost more than an angel to own or travel a stud horse, there would still be a fair return for money invested in stud horses, which are imported for sale or for purpose of travel.

It is satisfactory to learn from different quarters that many Shire horses were imported last year, also that heavy draught horses of all breeds when imported were more easily disposed of and that at better prices than has been the case for some time past.

You will be pleased to learn from the Secretary-Treasurer's report, which is before you, that our membership has more than doubled, that our balance on hand is nearly twice that of last year, and that our registrations are nearly thrice what they were a year ago. It is regrettable that our mother society in England thought fit this year to charge us for a copy of their Stud Book, instead of, as in former years, making us a present of the same. Were it not for this extra cost, which has been incurred through the action of a kindred society, I should have strongly advised the issuance this year of our first volume. Even as it is, it might be as well to take into consideration the appointment of a committee for the compilation of a Stud Book, which, with your sanction, would be issued during the present year, should the funds of the Society warrant such a course.

The following resolution was then adopted:—Whereas this Association has learned that purchasers of Shire horses for exportation to the United States are put to much inconvenience and delay in shipment because of the neccssity under present regulations of registering in the American Stud Book in order to pass the Customs. It is therefore resolved that, inasmuch as the standard of the Shire Association is precisely the same as that of the American Record, and that such horses, to be useful in the United States, must, in the end, be recorded there, this meeting is of the opinion that every interest would be subserved and properly protected by admitting Shire horses on presentation to the Customs authorities of properly accepted certificates of registration signed by the Registrar, under the control of the Department of Agriculture of Ontario. And be it resolved further, that a committee consisting of H. N. Crossley, President, and H. Wade, Secretary, be hereby appointed to enlist the co-operation of the American Shire Horse Association in presenting this view to the proper authorities at Washington.

A communication was then read from J. Sloughgrove, Secretary of the Shire Horse Society, London, Eng., stating, in reply to a letter from the Secretary of the Canadian Record, that he did not think their Council would have any objection to sending a copy of their Stud Book annually to the Canadian Shire Horse Society. He also stated the fee to join their Society was £1 1s., and enclosed a form of application for membership.

ELECTION OF OFFICERS.

The following officers were then elected for the ensuing year:

President: H. N. Crossley, Rosseau and Toronto.

Vice-President: W. E. Wellington, Toronto

Directors: John Guardhouse, Highfield; Jas. M. Gardhouse, Highfield; Wm. Hendry, Jr, Hamilton; Wm Wilkie, Toronto; H. J. Smith, Highfield; Geo. Garbutt, Thistleton; Thos. Skinner, Mitchell.

Delegate to Industrial Exhibition: John Gardhouse, Highfield, Ont.

Delegates to Western Fair: H. Wade, Toronto; Thos. Skinner, Mitchell.

Delegate to Central Exhibition, Ottawa: John Gardhouse, Highfield Ont.

Delegates to Horse Breeders' Association: H. N. Crossley and W. E. Wellington.

Judges Recommended for Spring Show: Richard Gibson, Delaware, and R. P. Sterricker, Springfield, Ill.

Other Shows: R. Gibson, J. Y. Ormsby, John Gardhouse, Thos Skinner.

Committee on Stud Book: H. N. Crossley, John Gardhouse, and H. Wade.

Auditor: C. F. Complin, London.

Secretary-Treasurer: H. Wade.

SHIRES AT THE TORONTO INDUSTRIAL EXHIBITION, 1898.

Prizes won by Shires at the Toronto Exhibition, August 29th to September 10th, 1898.

Stallion, four years old and upwards.

1st. Kilburn (imp.) [265] (15179); brown, stripe on face, hind pasterns white; foaled June, 1893. Bred by Daniel Dewhurst, Staining, Blackpool, Lancashire, Eng.; imported in 1895 by Berry & Bell, Hensall, Ont.; sire, Herod (11609); dam, Black Bess (Vol. XI. E.S.A.). Exhibitors, Berry & Geiger, Hensall, Ont.

2nd. Pride of Hatfield (imp.) [256] (13103); bay, stripe on face, three white legs; foaled in 1890. Bred by Geo. Smales, Yorkshire, Eng.; imported by exhibitors; sire, Lancashire Lad 2nd (1365); dam, Flower (16664). Exhibitors, Morris, Stone & Wellington, Welland, Ont.

3rd. Prince Charles (imp.) [196]; bay, white stripe on face, left front and hind feet white; foaled in 1888. Bred by exhibitors; sire, Carbon (3523); dam, Lancashire Lass (imp.) [70] (Vol. VI.). Exhibitors, Morris, Stone & Wellington.

4th. Royal Champion 4th (imp.) [242]; bay, three white feet; foaled in 1888. Bred by Robt. Sharp, Kirkham, Lancashire, Eng.; imported by E. R. Hogate, Omaha, Neb.; sire, Fen Champion (3085); dam Bute (Sharps) (Vol. X.).

Stallions, two years old.

1st. Rosseau Royal Albert [271]; bay, white hind fetlocks; foaled in 1896. Bred by J. T. Brown, Althorpe, Yorkshire, Eng.; imported in 1898 by exhibitor; sire, Patrician (10143); dam, Althorpe Dewdrop (17668). Exhibitor, H. N. Crossley, Rosseau, Ont.

Yearling colt, entire.

1st. Fitzsimmons [270]; bay, white star, three white feet; foaled May, 1897. Bred by exhibitor; sire Duke of Blagdon (imp.) [257]; dam, Queen of Highfield [117]. Exhibitor, J. M. Gardhouse, Highfield Ont.

Stallion, any age.

1st. Kilburn (imp.) [265] (15179). Exhibitors, Berry & Geiger, Hensall, Ont.

Filly, three years old.

1st. Dolly [110]; bay, front feet white, stocking on near hind leg; foaled in 1895. Bred by exhibitors; sire, Pride of Hatfield (imp.) [256]; dam, Lottie (imp.) [35]. Exhibitors, Morris, Stone & Wellington, Welland, Ont.

Filly, two years old.

1st. Laura [112]; bay, stripe on face, near front and both hind legs with white stockings; foaled May 1st, 1898. Bred by exhibitors; sire, Pride of Hatfield (imp.) [256] (13103); dam, Daisy [82]. Exhibitors, Morris, Stone & Wellington, Welland, Ont.

Yearling filly or gelding.

1st. Irene [118]; bay, off hind foot white, white between eyes; foaled in 1897. Bred by exhibitors; sire, Pride of Hatfield (imp.) [256] (13103); dam, Daisy [82]. Exhibitors, Morris, Stone & Wellington, Welland, Ont.

2nd. Violet [126]; bay, star on forehead, hind fetlocks white; foaled in 1897. Bred by exhibitors; sire, Pride of Hatfield (imp.) [256] (13103); dam, Elsie Morin (imp.) [34]. Exhibitors, Morris, Stone & Wellington, Welland, Ont.

Brood Mare, with foal of same breed by her side.

1st. Queen of Highfield [117]; bay, ratch on face, one front and two hind feet white; foaled May, 1890, Bred by Jas. Gardhouse & Son, Highfield, Ont; sire, King of the Castle (imp.) [71] (3171); dam, Maggie May by England's Glory (imp.) [79] (737). Exhibitor, J. M. Gardhouse, Highfield, Ont.

2nd. Leta [101] light bay, white face, stockings on hind legs, off front foot white; foaled January, 1893. Bred by exhibitors; sire, Chieftain 2nd (imp.) [194] (5723); dam, Lancashire Lass (imp.) [70]. Exhibitors, Morris, Stone & Wellington, Welland, Ont.

Foal of 1898.

1st. Exhibitor, J. M. Gardhouse, Highfield, Ont.

2nd. Sunflower [125]; bay, white stripe on face, stockings behind white; foaled in 1898. Bred by exhibitors; sire, Pride of Hatfield (imp.) [256] (13103); dam, Leta [101]. Exhibitors, Morris, Stone & Wellington, Welland, Ont.

Mare with two of her progeny.

1st. Queen of Highfield [117]. Exhibitor, J. M. Gardhouse, Highfield, Ont.

Span of Shires, geldings or mares.

1st. Exhibitor, Alex. Wild, Toronto.

2nd. Exhibitor, Alex. Wild, Toronto.

DOMINION DRAUGHT HORSE BREEDERS' SOCIETY.*

TWELFTH ANNUAL MEETING

The Annual meeting was held at Clinton on Wednesday, December 14, 1898.

The members of the Council met at 10 o'clock a.m., President McMillan in the chair.

Messrs. Innes and Henderson reported their attendance at the meeting of the Canadian Horse Breeders' Association, as representatives of this Society, and Messrs. Blackall and Henderson reported their attendance at the Western Fair Board. The list of judges on draught horses recommended to the latter by this Society had been accepted, and the donation of $25 offered for competition by draught mares has been competed for and duly awarded.

The Secretary read a letter from Mr. Hill, secretary of the Industrial Fair, that our application for representation on that board would be considered in due season.

Regarding the insurance of the books and papers of the Society, the Secretary reported that an amount of $500 would require a premium of $6.

These reports were accepted and referred to the annual meeting.

At 1.30 p.m. President McMillan called the annual meeting to order, and the minutes being approved the following reports were read :

SECRETARY'S REPORT.

Entries since last meeting, stallions		3
" " " mares		8
		11
Fees received for registering stallions	$6 00	
" " " " mares	9 00	$15 00
" " " membership		5 00
Annual dues received		9 50
Total		$29 50

Members in good standing :

Paid to November 30, 1897	3
" " 1898	17
" " 1896	4

Assets of the Society, November 30, 1898 :

Copies of Volume "A" of Stud Book	80
" " "B" " "	200
" " "C" " "	75

One stamp seal.
One Register, Volume "A."
One " " "B."
One " " "C."
One minute book.
One letter copying press.
One letter copying book.
Three letter copying books, used
One day book.
One cash book.

Stationery : 40 entry forms : 12 letter heads ; 10 registry certificates : 25 envelopes.

* NOTE.—This report of the Dominion Draught Horse Breeders' Society is printed here at the request of the Society. It is an independent society not organized under the Acts referred to on page 107.

Other Stud Books :

British C. B ..... Volumes 1 to 20
English Shire Books ..... " 1 to 8
Canadian Clyde Books ..... " 1 to 5
7th, 8th, 9th and 10th annual reports of State University of Wisconsin.

A large quantity of letters of correspondence, and all the entries for the repective volumes—nearly 3,000 documents.

AUDITORS' REPORT.

December, 14th, 1893.

To the Officers and Members of the Dominion Draught Horse Breeders' Society :

GENTLEMEN,—We, the undersigned Auditors, beg leave to report as follows : We have examined the Society's books and submit the following statement :

Receipts

To Annual dues	$ 9 50
" New member—one	5 00
" Entrance fees, 2 stallions by non-members	6 00
" Entrance fees, 7 mares	9 00
" Interest accrued on bank account	32 25
" Cash drawn from bank account	82 56
Total	$144 31

Expenses.

To Printing, $1.00, postage, $1.61	$ 2 61
" Annual meeting, Dec. 8th, 1897	19 30
" Delegates to Horse Breeders' Association, Toronto, and Fair Board, London	19 00
" Secretary's salary	50 00
" Treasurer's salary	20 00
" Interest on money advanced	40
" Auditors' Salary	8 00
" Special prize Western Fair Board	25 00
Total	$144 31

Assets of Society.

Dec. 14, 1898, to balance cash in Treasurer's hands	$ 34 44
Dec. 14, 1898, to deposits in Molson's bank, Clinton	965 00
	$999 44

Signed,
THOS. McMILLAN, }
SAM'L SMILLIE, } Auditors.

ELECTION OF OFFICERS AND COUNCIL.

The election of officers and seven members of council whose term of office had expired was then proceeded with and resulted as follows :

President ..... John McMillan, M P., Constance.
Vice President ..... D. McIntosh, V.S., Brucefield.
Secretary ..... James Mitchell Goderich.
Treasurer ..... P. McGregor, Brucefield.

Members of Council.

John McDiarmid, Lucknow.
James Henderson, Belton.
John Avery, Clinton.
Thomas Green, Dublin.
O E. Mason, Brucefield.
John Watt, Harlock.
John Ketchen, Brucefield.

The other members of Council whose term will expire at the annual meeting in 1899 are : Alex Innes, Clinton ; John Busch, Sebringville ; George Stanbury, Clinton ; J. E Blackall, V.S., Clinton ; Wm. Sinclair, Chiselhurst ; D. McCole, Lakeside.

Auditors :—Thos. McMillan was elected by the Society and S. Smillie by the Council at their subsequent meeting.

Mr. McMillan, after thanking the meeting for the renewal of their confidence, spoke on the desirability of keeping the Society fully represented in the Canadian Horse Breeders' Association and on the Industrial and Western Fair Boards; he felt assured that a few years longer would see a change in the condition of the various Stud Books, and a better recognition of the merits of mixing the Clyde and Shire breeds. He also urged a compilation of the rules and regulations of this Society, and all amendments and additions since their original adoption, and the printing of these with a concise report of the Society's finances and present condition, for distribution by the Directors and by the Secretary in his correspondence.

The notice of motion given last year by Messrs. Sinclair and Ketchen, to reduce the membership fee from $5 to $3, was adopted unanimously.

The following were appointed as representative delegates to the bodies named: Canadian Horse Breeders' Association, Messrs. Henderson and Innes; Industrial Fair, President and Vice-President; Western Fair, Messrs. Henderson and Mason.

On motion of Messrs. Henderson and Green, the Secretary was instructed to compile all the rules and regulations up to date, and also prepare a report of the Society's finances and have same printed for general distribution.

On motion of Messrs. Innes and Ketchen, $10 each were voted to the West Huron, South Huron and North Perth exhibitions, to be offered in two prizes of $6 and $4 for fillies two years old and under, registered with this Society.

The following were named for recommendation to the Industrial and Western Fair Boards as competent judges on horses, viz.: Messrs. McIntosh, McDiarmid, Henderson, Mason, Innes and McGregor.

This concluded the business of the annual meeting, which was then adjourned to be called for the second Wednesday of December, 1899, at Clinton.

JAS. MITCHELL, Secretary.

THE ANNUAL MEETING

OF THE

Dominion Cattle Breeders' Association

WILL CONVENE IN THE

FARMERS' PAVILION, EXHIBITION GROUNDS, LONDON,
MONDAY, DECEMBER 11th, AT 7.30 p.m.

. . . Programme

1. Addresses and Reports of Officers.
2. Reports of Committees.
3. Nomination of Expert Judges.
4. Election of Delegates to Fair Boards.
5. Election of Officers.
6. An Illustrated Address entitled "An Ideal Beef Bullock," by Prof. C. F. Curtiss, Director Iowa Experiment Station, Ames, Iowa.
7. Addresses by Judges in the Cattle Department.

THE ANNUAL MEETING

OF THE

Dominion Swine Breeders' Association

WILL CONVENE IN THE

FARMERS' PAVILION, EXHIBITION GROUNDS, LONDON,
WEDNESDAY, DECEMBER 13th, AT 7.30 p.m.

. . . Programme

1. Routine Elections, Etc.
2. Prof. G. E. Day will deliver an address dealing with the Requirements of the Home and Foreign Markets for Pork and Pork Products.
3. Addresses by Judges in Bacon Classes.

THE ANNUAL MEETING

OF THE

Dominion Sheep Breeders' Association

WILL CONVENE IN THE

FARMERS' PAVILION, EXHIBITION GROUNDS, LONDON,
THURSDAY, DECEMBER 14th, AT 7.30 p m.

. . . Programme

1. Routine Elections, Etc.
2. An Illustrated Address entitled "An Ideal Mutton Sheep," by Prof. John A. Craig, Ames, Iowa.
3. Addresses by Judges of Block Tests in the Sheep Department.

A Joint Public Meeting

Will be Held in the **City Hall, London.**

DECEMBER 12th, AT 7.30 P.M.

The Chair will be occupied by the Hon. Sir John Carling, London.

PROGRAMME

1. THE CHAIRMAN'S ADDRESS OF WELCOME.
2. REPLY—Hon. John Dryden, Toronto.
3. ADDRESS—Hon. Sydney Fisher, Ottawa.
4. ADDRESS—Prof. J. W. Robertson, Ottawa.
5. ADDRESS—Dr. Jas. Mills, Ontario Agricultural College, Guelph.
6. ADDRESS—J. S. Woodward, Lockport, N.Y.

Musical Programme will be announced later.

IMPORTANT NOTICE

HALF FARE PASSENGER AND FREIGHT RATES from any part of Ontario to London and return, good from December 7th to 19th, inclusive.

SPECIAL INDUCEMENTS to parties who bring Show Animals over 100 miles.

For particulars, apply to

A. P. WESTERVELT, Secretary,
Parliament Buildings,
Toronto, Ontario.

SIXTEENTH ANNUAL

Ontario Provincial Fat Stock and Dairy Show

WILL BE HELD
IN THE . . .

CITY OF LONDON

December 11th to 15th, 1899.

UNDER THE
AUSPICES OF

The Dominion Cattle Breeders' Association.
The Dominion Sheep Breeders' Association.
The Dominion Swine Breeders' Association.
The Cheese & Butter Association of Eastern Ontario.
The Western Fair Association.
The London Board of Trade.
The Middlesex County Council.
The London City Council.

Over $5,300.00 offered in Prizes

DAIRY STOCK must be in the Stalls at 2 p.m. December 11th; all other Stock at 1 p.m. December 12th.

PRIZE LISTS AND ENTRY FORMS may be had upon application to A. P. Westervelt, Secretary, Parliament Buildings, Toronto.

REPORT

OF THE

SUPERINTENDENT

OF

FARMERS' INSTITUTES

OF THE

PROVINCE OF ONTARIO.

1898-9.

(*PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.*)

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FIFTH ANNUAL REPORT

OF THE

SUPERINTENDENT OF FARMERS' INSTITUTES

OF

ONTARIO

FOR THE YEAR 1898-9.

To the Honorable Minister of Agriculture:

I have the honor to submit herewith my fifth Annual Report as Superintendent of Farmers' Institutes.

Your obedient servant,

F. W. HODSON.

FARMERS' INSTITUTES OF ONTARIO.

ANNOUNCEMENT OF SUPERINTENDENT.

A fair indication of the interest taken in Farmers' Institute work by those actively engaged in agriculture in this Province, is the fact that the total number of members from January to to July 1899 is 457 in advance of the total membership for the same period of 1898. Not only is this the case, but those who are members are exceedingly anxious to receive all reports and bulletins issued by the Department of Agriculture. This is proved by the fact that should any report or bulletin fail to come to hand at the proper time a card of enquiry is sure to be received by the Department. The audiences at the various meetings are composed of a better class of people than formerly; meetings are better conducted and are more thoroughly advertised. While the development of local talent is very noticeable, there is, in some districts, still room for improvement in this respect; on the whole, however, the progress made in the employment of local talent and in the carrying on of meetings generally has been very satisfactory.

Meetings and Attendance.

The attendance at meetings this year, as reported by the officers of the local Institutes, was 119,402. This number, however, falls short of the actual attendance for the reason that reports from several Institutes have not been received. Altogether 677 meetings were held this year, as compared with 658 last year.

Two Addresses only each day should be given.

During previous years it has been the custom for delegates attending meetings to speak as long and as often as the officers of the local Institutes might think desirable. Owing to this the delegates in some cases have not been able to do as good work in the later meetings of a division as they did in the earlier ones. Last year this fact was brought by the Superintendent to the attention of the officers of the Institutes, and as a result the average number of addresses at each meeting was slightly decreased. This year it will be in the best interests of the work if positive instructions be given to each delegate to deliver but two addresses each day.

Successful Meetings due to Good Management.

In order that meetings shall be successful the necessary preparation therefor should begin at the annual meeting. That is to say at the annual meetings efficient officers and directors should be elected and suitable places and halls chosen. It must be remembered that the director for the district in which the meeting is to be held is a member of the Executive until after the meeting is held. Upon the shoulders of the director should fall the main work of looking after the details and the arrangements for holding the meeting. For example, he should see that the local interest is thoroughly worked up and that the advertisements of the meeting are systematically and thoroughly distributed. This director should, therefore, be both capable and willing. If an efficient local director is elected the secretary-treasurer will be relieved of a great portion of the work which would otherwise fall upon him. Not only so, but this work can always be better done, and be done with less expense and less trouble, by someone in the district than by an outsider. But at the same time it must not be forgotten that it is the duty of the secretary-treasurer to see that this work is properly done. When no one else does it he must do it himself. Where a meeting is a failure it is generally for lack of proper management. Occasionally outside causes may injure the meeting, but as a rule in all cases of non-success, blame may be properly attached to the executive officer.

Some Illustrations.

As to how much success depends on proper management the case of West Lambton may be taken as an illustration. The membership for that Institute for 1898 was 78. With a change in the management the membership for this year (1899) to July ran up to 294. A further illustration may be seen in the history of East Algoma. In that district the Institute dragged out a

sorry sort of existence for several years and finally died. In 1895 the membership was 107, and the total attendance at meetings held was 513. In 1896 the membership was 75 and the attendance at meetings 332. In 1897 the membership had dwindled to 16 and no meetings were held. The management claimed that it was impossible to keep up an interest in Institute work, and the Institute practically went out of existence. In the summer of 1898 a reorganization meeting was held and an entirely new board of officers and directors was appointed. The result was that, though no meeting but that of reorganization was held in that year, before the end of the year over 100 members had joined the Institute. For the present year the membership to July is 141, and the attendance at meetings held 761.

What will be done in cases of lack of interest.

Sometimes it has happened that even when a meeting has been properly advertised, and all the work preparatory to holding it thoroughly done, no interest has been taken in the meeting by the people of the locality for whose more special benefit the meeting was held and the lecturers sent. When this occurs in future no lecturers will be sent for meetings to be held in a locality that proves itself so indifferent until there is evidence that some interest will be taken in the meetings when they are held there.

Where Meetings should not be held.

The local authorities of each place where a meeting is proposed to be held should take sufficient interest in the work to provide a hall or other place for holding a meeting entirely free of cost to the Farmers' Institute. I would recommend that no meeting be held in any place where the local authorities are not able and willing to comply with this condition. If they cannot or will not do this much for the benefit of the meeting, there is slight probability of a successful meeting being held in this locality.

Frivolous Entertainments Prohibited.

As a rule the best meetings are held in villages or small towns. In the larger towns the audience consists not only of those who attend for the purpose of obtaining practical information, but also of those who attend for mere amusement. In order to draw a crowd at these evening meetings some Institutes have been in the habit of allowing such talent as the "Kickapoo Indians," or other companies of similar character, to give entertainments. This is in direct opposition to clause 32 of the Rules and Regulations which reads as follows :—

No subject shall be presented at an Institute meeting, or discussion allowed, of a political or sectarian nature ; nor shall any speaker be allowed in his lecture, essay or speech, or in any discussion, to advertise wares or schemes in which he has a direct or indirect pecuniary interest. The delegates and officers of the Institute shall see that the exercises are not subordinated to any low or frivolous entertainments or to the aggrandizement of any individual, party or sect."

Last year some of the delegates quite properly took the stand of absolutely refusing to speak at meetings at which any of these troupes were present. Such performers are there for the purpose of advertising their wares, something which every Institute is especially expected to guard against. Hereafter when Institutes adopt the course complained of, the speakers sent to them by this Department will immediately withdraw from the meetings and will abstain from taking further part in them.

Delegates not Allowed to Advertise Goods.

In one or two cases it has happened that delegates who have been appointed by this Department in good faith have, immediately upon arriving at a place of meeting, begun to advertise merchandise in which they were personally interested. These men should have instantly been dismissed by the chairman of the delegation of which they formed a part. The duty of a chairman of a delegation is quite plain from the reading of clause 32, above quoted.

If the chairman of a delegation where this clause is contravened is remiss in his duty in the matter, the officers of the Institute visited are at liberty, and indeed, are expected, to take the matter in their own hands It has sometimes happened, also, that Institutes have on their own account engaged speakers to attend their meetings whom they knew would attend for the express purpose of advertising their wares. Many complaints in regard to this matter have been made to the Superintendent. Institutes are, hereafter, expected to comply with clause 32 to the letter.

In other cases it has happened that persons have attached themselves to delegations and followed them from one place of meeting to another, and have been allowed to deliver addresses at the various meetings, the officers believing that these persons were in attendance at the request of the Superintendent. Officers and others will please note that no person is sent to address meetings by the Superintendent unless his or her name is advertised in the official bulletin. This rule is absolutely adhered to except in cases of unavoidable absences of delegates so advertised. In such cases of unavoidable absence special notices are always sent to the officers of every Institute affected, and also to the chairman of the delegation concerned. Every chairman, therefore, is instructed not to allow hangers-on to impose themselves upon the officers of Institutes, and thereby use the meetings for their own self-aggrandizement. When it happens that parties insist on following a delegation in this manner, the chairman of the delegation is instructed at the opening of each meeting to announce that these parties are not members of the delegation, and are present without the knowledge of the Superintendent, and are acting entirely in their own interest.

Expenditure of Institute Funds.

Clause 70 of the Rules and Regulations reads as follows :—"All money received, whether as members' fees, legislative grant from the county councils or from municipalities, or otherwise, shall be spent within the district in which the Institute operates, (1) to defray actual expenses of meetings such as are heretofore described ; (2) to employ suitable persons to address said meetings ; (3) to assist in circulating agricultural, horticultural, live stock and dairy literature or periodicals among the members, or to establish a circulating agricultural library for the use of members ; (4) to remunerate the secretary and others for services rendered ; (5) to make an annual grant (not exceeding ten dollars) to the Women's Institute in the district."

Some Institutes have heretofore been in the habit of giving a grant to the Agricultural Societies. This does not come within the meaning of clause 70, and it is not expected that any of the funds of the Institute be used for this purpose. The Agricultural Associations each receive grants from the Department of Agriculture, and are under separate management.

Local Institutes

The Rules and Regulations governing Farmers' Institutes are the Constitution and By-laws for all local Institutes. Under these Rules and Regulations each local Institute has power to carry on any local work it may consider for the best interests of its members, providing such work is not contrary to the Rules and Regulations. The Institute in every district will be just what it is made by its members and officers and directors. Local Institutes were not organized and are not conducted for the sole purpose of holding a few meetings to which special delegates are sent by the Department of Agriculture to deliver addresses, although this is the idea of their existence that some Institutes seem to entertain. Each Institute is expected to develop its own character and its own work in its own district. Some Institutes at the present time hold meetings regularly during the winter at which none but local talent is present. Each Institute is entirely independent of every other, and should work out its own development in its own way. All that is necessary in order that it may branch out on any line of work that it chooses is for the officers to determine what work they wish to do and then to go ahead and do it.

Changes in the Rules and Regulations.

Several changes have recently been made in the Rules and Regulations, the principal one being in regard to the holding of the annual meetings. Clause 14 provides that the annual meeting be held on some date to be selected between the 1st and 20th of June. Clauses 16, 17, 18 and 19 read as follows :

"16. Each year a meeting of the directors shall be called by the secretary to meet sometime before the 1st of March. The special business of this meeting shall be to arrange for holding the annual meeting.

"17. If it is thought desirable by the directors present at this meeting that a delegate or speaker be in attendance at the annual meeting, the same may be arranged for through the Superintendent, in which case the local Institute shall pay the actual travelling expenses of the delegate or speaker from the time he or she leaves home until he or she returns thereto.

"18. If it is decided that a request be sent to the Superintendent for a speaker to attend the annual meeting, the directors shall, in addition, select the place for holding above meeting, the date being selected by the Superintendent, as in the case of winter meetings. If, however, it is decided not to ask for a speaker through the Superintendent, the directors shall select both date and place for holding annual meeting, conforming with clause 14.

"19. A full report of this directors' meeting shall be forwarded by the secretary to the Superintendent on or before the 1st of March."

About one-third of the Institutes availed themselves of the opportunity of having a delegation attend their annual meeting of 1899. As announced last year, the only time at which the professors of the Ontario Agricultural College are able to attend meetings is during the month of June Very successful meetings were held in several divisions. One division each was attended by Professors Shuttleworth, Reed, Day and Reynolds and Miss Laura Rose.

A copy of the Rules and Regulations will be mailed to every officer and director of a Farmers' Institute in Ontario. Every such officer and director is expected to make himself thoroughly familiar with these Rules, so as to intelligently conduct the meetings for which he is responsible on the lines there laid down.

Institute Officers.

The speakers to attend the meetings of an Institute should be notified by the secretary of the Institute of the subject on which they are to speak, at the earliest possible date, and if possible a copy of the poster advertising the meetings should be mailed to them. Although it is of great advantage to a speaker to know on what subject he will speak before arriving at a place of meeting, the officers of many Institutes have been very careless in this respect, and many complaints in regard to this have in the past been made by the delegates The difficulty in some cases is that the Institutes whose meetings are the later ones of a division do not select subjects or prepare posters until the delegates have begun to attend the meetings held early in the division. By this time the delegates are so situated that they do not receive their mail matter regularly, and it often happens that they get no information whatever regarding the meetings, except that which is contained in the official bulletin. All arrangements should be made before the speakers leave their homes, so that full information regarding each meeting in a division may be received by the delegates before they start out on their trips.

Number of Delegates and Number of Addresses.

It is the present policy of the Department to place but two delegates on the regular divisions and to have in some cases but one delegate attend supplementary meetings. It may not be possible always to comply with this policy, but so far as circumstances will allow it will be strictly adhered to. Each delegate will be expected to deliver but two addresses each day—one address at each session. A number of Institutes report that it is impossible to employ local talent when so much time is taken up by delegates. By decreasing the number of delegates and limiting the number of addresses to be delivered by them it is believed that less dependence will be placed on the delegates and more on local talent. This ultimately will prove to be a great benefit.

Programmes.

The name of no person shall be placed on the programme who has not agreed to do what is advertised, and any person who after agreeing to take part at any meeting does not fulfil his or her promise, unless for some absolutely unavoidable reason, should be given no second opportunity to so ill-use the board of management and those who are in attendance at the meeting. After a programme has been advertised no change should be made therein except by the unanimous consent of the meeting.

Chairman.

It is most important that at every meeting a suitable chairman be placed in charge,—a chairman who will be able to keep up interest and preserve order. A meeting which would otherwise be most successful will certainly be a failure if the chairman is not properly fitted for the duties he is expected to perform.

Papers from Local Institutes.

Clause 60 of the Rules and Regulations requires that each Institute supply the Superintendent for publication two papers prepared by local talent. This rule has been complied with by most Institutes, although the officers of some Institutes are very negligent in this respect. A number of the papers so received are published in the annual report; the great majority, however, will be published in the provincial and local weekly and agricultural papers of the Province.

This plan of publishing good papers sent by local Institutes is very important. By it two benefits are secured, first, local talent is encouraged and developed, for a man will always take pride and interest in what he writes when he realizes that if he does so he will have the privilege of impressing his ideas upon a large number of his fellowmen; second, the valuable practicable information brought out in individual localities, which, were it not for this plan of publication, would be confined to these localities, is disseminated throughout the Province generally.

Report of 1897-8.

Many gratifying comments have been made regarding the Report of the Superintendent of Farmers' Institutes for 1897-8. A large amount of labor and care was necessary in the preparation of that volume, and it is very pleasing and satisfactory to know that the work spent upon it has been appreciated by those for whom it was specially prepared.

Acknowledgment to the Press.

I wish to thank the press of Ontario for their co-operation and assistance, so freely given to help along the work of the Ontario Farmers' Institutes. The press as a whole have been very courteous, and much credit is due to the local newspapers for the benefit which the Province of Ontario derives from Farmers' Institutes to-day. I trust that the friendship of the press to the Farmers' Institute system may long continue.

In closing my work as Superintendent of Farmers' Institutes for this Province, I wish to thank the local officers and directors, and the regular and supplementary speakers for their constant and able co-operation. That the Farmers' Institutes of Ontario are on a sound basis and acknowledged by every province in Canada and nearly every state in the American Union to be a practical, progressive and model system of agricultural education is due in a large measure to the untiring energy and self-sacrificing spirit of many of the local officers.

I have also to express my gratitude and thanks for the help which I have received in my work from my official superiors. The Hon. John Dryden, Minister of Agriculture, and Mr. C. C. James, the Deputy Minister, have each been a tower of strength to me in my efforts to establish and maintain the Farmers' Institute system of the Province as now existing.

It is right, too, that I should say that Mr. A. P. Westervelt, who has been for five years my assistant, and who has acted as Accountant of the Farmers' Institute system, also deserves very much credit. He succeeds me as Secretary-Treasurer and Managing Director of the Dominion Live Stock Associations and of the Provincial Winter Fair, having been recently elected to these positions by the unanimous vote of the directors. He also continues as Accountant of the Farmers' Institute system and Assistant to the Superintendent.

Prof. Geo. C. Creelman, B.S.A., has been appointed my successor as Superintendent of Farmers' Institutes, and I earnestly ask for him the hearty support and co-operation of all parties interested in agriculture and in the welfare of Ontario. He has a great and growing work before him. The Farmers' Institute system is now but in its infancy, its possibilities for good being, humanly speaking, almost unlimited.

REPORTS OF LOCAL FARMERS' INSTITUTES

Institute district.	Membership, December, 1898.	Membership to July, 1899.	No. of meetings held.	Total attendance.	No. of papers read or addresses delivered.	Receipts.					
						Cash on hand per last report.	Members' fees.	Donations.	Grants.	Receipts from conventions.	Receipts from excursions.
						$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Addington	69	67	6	438	19	13 91	16 50	.....	50 00	.....	.....
Algoma, Centre	153	141	4	174	19	78 52	50 50	.....	50 00	.....	.....
Algoma, East	100	141	7	761	37	.....	25 50	.....	25 00	.....	.....
Amherst Island	50	55	6	1,005	11	37 87	15 25	.....	25 00	.....	.....
Brant, North	142	168	7	946	30	.....	29 00	.....	50 00	.....	11 00
Brant, South	115	90	5	782	19	38 75	21 75	.....	50 00	.....	.....
Brockville	152	149	7	1,317	32	33 37	40 00	.....	50 00	.....	.....
Bruce, Centre	117	94	7	1,010	25	42 11	23 00	....	50 00	.....	111 99
Bruce, North	92	115	6	241	15	64 48	29 50	.....	25 00	.....	50 30
Bruce, South	148	179	6	2,625	41	90 41	29 75	.....	50 00	.....	137 55
Bruce, West	234	183	10	928	35	43 70	45 25	.....	50 00	.....	158 16
Carleton	118	173	7	1,851	51	17 01	29 75	.....	50 00	.....	.....
Cornwall	75	105	7	1,270	29	11 52	24 00	12 50	37 50	.....	.....
Dufferin	122	195	7	491	14	90 78	47 25	.....	74 90	.....	81 00
Dundas	222	251	5	2,360	30	83 91	63 00	.....	50 00	.....	74 77
Durham, East	125	141	7	715	18	44 80	34 25	.....	50 00	.....	.....
Durham, West	188	154	8	470	22	78 36	39 25	.....	50 00	.....	.....
Elgin, East	118	175	6	595	16	85 44	42 00	.....	25 00	.....	.....
Elgin, West	173	147	7	745	38	11 49	32 75	.....	50 00	.....	.....
Essex, North	67	43	.....	.....	.....	.....	.....	.....	.....	.....	.....
Essex, South	156	212	7	1,785	49	135 64	54 25	.....	75 00	.....	.....
Frontenac	109	104	5	1,005	23	19 89	24 00	.....	50 00	.....	.....
Glengarry	196	224	7	1,845	24	.....	54 50	.....	50 00	.....	.....
Grenville, South	154	104	5	1,306	22	58 94	24 50	.....	50 00	.....	.....
Grey, Centre	189	192	7	942	41	46 06	48 25	.....	50 00	.....	.....
Grey, North	285	259	7	685	30	20 13	63 75	.....	50 00	.....	.....
Grey, South	184	176	6	1,760	29	159 03	42 50	.....	50 00	10 55	.....
Haldimand	235	281	6	1,635	45	242 78	66 75	.....	50 00	.....	345 85
Halton	334	417	6	2,540	26	187 45	106 00	.....	50 00	.....	89 00
Hastings, East	143	156	7	1,420	39	19 48	37 75	.....	50 00	.....	.....
Hastings, North	535	438	21	2,054	83	12 70	105 00	.....	50 00	.....	.....
Hastings, West	142	118	6	1,260	42	85 21	39 25	.....	50 00	.....	.....
Huron, East	198	280	7	1,939	38	59 00	71 00	.....	50 00	.....	.....
Huron, South	138	164	6	1,075	37	125 52	40 25	.....	50 00	.....	.....
Huron, West	349	205	8	1,655	38	78 90	52 50	.....	50 00	.....	78 00
Kent, East	226	254	7	1,035	28	.....	61 75	.....	50 00	.....	.....
Kent, West	145	122	6	486	30	99 65	44 25	5 00	50 00	.....	.....
Lambton, East	199	189	7	1,025	34	28 01	44 25	.....	50 00	.....	.....
Lambton, West	78	294	9	1,045	68	1 94	63 75	.....	50 00	.....	3 65
Lanark, North	282	365	9	2,895	28	27 30	88 75	.....	.....	.....	.....
Lanark, South	187	126	7	2,005	44	.....	.....	.....	.....	.....	.....
Leeds, N. and Grenville, N.	130	94	8	970	28	22 30	24 00	.....	25 00	.....	.....
Leeds, South	196	227	7	2,035	56	.....	57 00	.....	50 00	.....	.....
Lennox	103	88	7	619	18	.....	.....	.....	.....	.....	.....
Lincoln	163	173	6	1,060	26	14 28	40 50	.....	55 00	.....	.....
Manitoulin, East	92	91	8	715	17	51 35	18 75	.....	25 00	.....	.....
Manitoulin, West	78	98	.....	.....	.....	.....	.....	.....	.....	.....	.....
Middlesex, East	232	195	7	1,430	38	113 33	47 50	.....	50 00	.....	115 00
Middlesex, North	340	359	12	2,985	94	213 12	89 00	.....	50 00	.....	163 00
Middlesex, West	204	141	7	950	21	60 05	35 00	.....	50 00	.....	.....

FOR YEAR ENDING 30TH JUNE, 1899.

Receipts.—*Con.*			Expenditure.											
Miscellaneous.	Balance due treasurer.	Total receipts.	Due treasurer per last report.	Expense for meetings.	Secretary's salary, etc.	Postage and stationery.	Printing.	Advertising.	Lecturers' expenses.	Lecturers' allowance.	Periodicals for members.	Miscellaneous.	Balance on hand.	Total.
$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	c.	$ c.	$ c.	$ c.	$ c.	$ c.
.....	.....	80 41	.....	23 50	20 00	7 47	8 25	1 25	.....	.....	.....	8 00	11 94	80 41
96 68	.....	275 70	.....	3 50	15 81	10 71	8 50	.....	.....	.....	.....	235 86	1 32	275 70
.....	.....	50 50	.....	1 00	2 25	4 02	.....	.....		.....	.....	. .	43 23	50 50
.....	.....	78 12	.....	14 33	10 00	04	4 61	. ....	8 95	.....	.....	... ..	40 19	78 12
.....	.....	90 00	.....	26 25	10 00	3 33	11 25	10 00	18 25	.....	.....	8 00	2 92	90 00
...	.....	110 50	.....	17 25	25 00	1 68	4 50	2 30	7 90	. .	.....	23	51 64	110 50
.....	.....	123 37	.....	18 00	15 00	1 13	14 25	6 60	24 85	.....	.....	25 00	18 54	123 37
.....	.....	227 10	.. ...	20 50	31 30	2 83	16 75	2 62	13 90	.....	4 80	. ....	134 40	227 10
.....	.....	169 28	.....	16 90	8 70	2 69	8 75	.....	27 61	.....	.....	.....	104 63	169 28
3 00	.....	310 71	.....	13 70	44 40	12 93	36 25	.....	12 30	.....	....	2 00	189 13	310 71
11 88	.....	308 99	.....	61 15	46 95	7 45	25 35	14 75	20 85	....	26 95	7 57	97 97	308 99
.....	....	96 76	.....	25 40	26 00	8 25	20 78	.....	.....	.....	.....	50	15 83	96 76
.....	3 88	89 40	.....	8 00	26 00	2 50	22 00	1 50	29 40	.....	.....	.....	... .	89 40
.....	.....	293 93	.....	59 45	20 00	5 53	17 60	7 25	....	.....	.....	.....	184 10	293 93
5 08	.....	276 76	.....	8 25	30 00	4 95	1 00	29 00	37 45	.....	....	25	165 86	276 76
.....	.....	1 9 05	....	39 85	25 00	7 50	20 50	. ....	.....	.....	.....	.....	36 20	129 05
3 05	.....	170 66	.....	17 30	20 00	....	39 65	.....	.....	12 70	.....	25	80 76	170 66
.....	.. .	152 44	.....	35 20	. ....	20 00	2 94	22 38	.....	.....	. ...	.....	71 92	152 44
.....	.....	94 24	.....	5 00	25 00	10 66	17 20	.....	23 25	.....	.....	25	12 88	94 24
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.... .	.....	264 89	.....	36 95	25 00	4 95	18 00	.....	47 80	.....	.....	21 35	110 84	264 89
.....	.....	93 89	.. ...	4 00	20 00	6 84	15 00	23 95	14 40	.....	.....	5 40	4 30	93 89
75	47 25	152 50	37 18	61 12	25 00	2 00	.....	17 50	9 70	.....	.. ..	.....	.....	152 50
.....	....	133 44	.....	4 50	20 00	3 52	13 00	.....	22 80	.....	.....	5 15	64 47	133 44
.....	.....	144 31	.....	68 30	10 00	8 64	12 95	2 00	.....	.....	.....	3 45	38 97	144 31
1 75	....	135 63	.....	45 15	41 80	13 30	11 75	9 00	. ....	.....	.....	1 95	12 68	135 63
21 15	....	283 23	.....	29 60	31 80	7 21	20 25	1 00	9 35	... ..	32 60	32	151 10	283 23
34 50	.....	739 88	.....	26 75	65 50	43 24	61 50	... ..	20 95	14 00	.....	15 44	492 50	739 88
.....	.....	432 45	.....	48 85	64 85	6 67	51 67	.....	6 00	.....	39 25	19 07	196 00	432 45
.....	.....	107 23	.....	14 75	25 00	15 55	19 75	.....	13 85	.... .	.....	5 90	12 43	107 23
.....	34 10	201 80	.....	49 10	60 00	7 30	25 00	.....	60 40	.....	.....	.....	.....	201 80
.....	.....	174 46	.....	49 90	30 00	4 00	12 25	25	26 00	... ..	.....	5 00	47 06	174 46
.....	.....	180 00	.....	67 65	22 35	7 87	14 00	4 50	21 83	.....	.....	1 03	40 77	180 00
.....	.... .	215 77	.....	49 00	15 00	6 14	2 50	31 00	5 75	.....	.....	11 25	95 13	215 77
.....	.....	259 40	.....	11 95	68 60	16 31	11 50	50	31 95	.....	.....	1 35	117 24	259 40
.....	.... .	111 75	8 01	19 00	20 00	17 84	21 25	.....	19 30	.....	.....	63	5 72	111 75
.....	.....	198 90	.....	7 00	43 15	5 75	4 75	3 00	26 20	.....	.....	.....	109 05	193 90
.....	.....	122 26	.....	25 75	23 00	9 63	6 25	... .	9 00	.....	.....	5 65	42 98	122 26
.....	.....	119 34	.....	7 50	46 35	6 38	15 50	2 25	29 25	5 00	.....	97	6 14	119 34
.....	.....	.....	.....	.....	. .	.....	.....	.....	.....	.....	.....	.....	.....	.....
12 00	.....	83 30	....	9 90	6 25	3 65	9 98	16 50	12 60	.....	.....	7 50	16 92	83 30
.....	8 05	115 05	4 99	63 25	15 00	7 81	24 00	.....	. ...	.....	.....	.....	.....	115 05
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
20 00	.. ..	129 78	.....	.....	30 00	5 18	20 00	15 00	9 60	. ...	.....	20 00	30 00	129 78
.....	.....	95 10	.....	2 00	12 00	2 20	7 60	.....	5 00	.. .	.....	.....	66 30	95 10
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4 82	.....	330 65	.....	33 35	38 15	12 15	31 00	28 73	13 75	.....	5 40	35	167 77	330 65
6 68	.....	521 80	.....	38 50	46 55	16 13	21 00	.....	9 90	25 00	.....	32 56	332 16	521 80
.....	....	145 05	.....	54 80	37 00	4 91	26 61	.....	.....	... ..	.....	.....	21 73	145 05

REPORTS OF LOCAL FARMERS' INSTITUTES

Institute district.	Membership, December, 1898.	Membership to July, 1899.	No. of meetings held.	Total attendance.	No. of papers read or addresses delivered.	Receipts.					
						Cash on hand per last report.	Members' fees.	Donations.	Grants.	Receipts from conventions.	Receipts from excursions.
						$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Monck	153	151	6	829	19	56 14	36 25	.....	55 00	.....	.....
Muskoka, Centre	53	65	5	218	12	22 15	16 25	.....	25 00	.....	5 05
Port Carling and Bala	34	61	9	462	28	....	15 00	.....	.....	...	34 25
Muskoka, North	187	191	7	433	35	.....	46 50	.....	25 00	....	7 06
Muskoka, South	63	78	5	229	15	46 97	17 50	.....	25 00	....	5 06
Norfolk, North	253	269	6	1,826	44	14 35	67 00	.....	50 00	.....	18 20
Norfolk, South	123	254	7	1,108	35	6 87	61 00	.....	50 00	.....	34 55
Northumberland, East	193	130	6	1,915	39	36 05	32 50	.....	50 00	.....	83 65
Northumberland, West	124	84	5	1,035	15	54 18	20 50	.....	50 00	.....	.....
Ontario, North	626	406	14	1,185	65	227 40	100 25	.....	50 00	.....	2 6 45
Ontario, South	266	247	9	645	34	45 67	60 00	.....	50 00	.....	.....
Oxford, North	121	134	6	1,205	39	13 39	10 25	.....	50 00	.....	.....
Oxford, South	173	214	6	1,554	35	88 77	52 75	.....	50 00	.....	.....
Parry Sound, East	107	92	5	437	13	45 83	21 75	.....	25 00	.....	.....
Parry Sound, West	123	94	9	268	45	23 21	22 75	.....	35 00	.....	.....
Peel	421	416	8	960	49	171 70	103 00	.....	50 00	.....	108 40
Perth, North	187	243	10	2,4 5	58	67 95	58 00	.....	50 00	.....	151 20
Perth, South	256	210	8	1,696	46	4 25	49 75	....	50 00	.....	74 00
Peterborough, East	152	153	6	36 45	24	6 10	30 00	.....	50 00	25 20	21 75
Peterborough, West	142	139	5	916	25	43 50	35 00	.....	50 00	4 70	.....
Prescott	107	88	5	800	31	18 72	17 50	.....	50 00	.....	.....
Prince Edward	303	315	10	1,480	24	87 62	77 75	.....	50 00	.....	.....
Renfrew, North	97	66	5	565	9	19 65	14 00	.....	50 00	.....	.....
Renfrew, South	122	110	5	994	22	89 74	27 50	.....	50 00	.....	.....
Russell	79	90	5	1,015	22	44 81	12 50	.....	50 00	.....	.....
Simcoe, Centre	156	118	8	496	34	104 21	22 75	.....	50 00	.....	165 65
Simcoe, East	160	229	13	2,041	48	75 26	7 00	.....	50 00	.....	72 85
Simcoe, South	105	140	6	940	25	.....	30 75	.....	49 75	.....	.....
Simcoe, West	145	151	6	1,110	24	91 59	23 75	.....	50 00	....	308 69
Stormont	170	209	8	1,525	36	.....	54 50	....	50 00	.....	.....
St. Joseph Island	96	88	7	2,574	32	104 40	24 25	.....	41 70	.....	.....
Victoria, East	126	148	11	2,109	51	28 16	31 50	....	50 00	14 45	4 67
Victoria, West	135	123	7	1,216	35	26 66	52 40	.....	50 00	.....	9 35
Waterloo, North	159	160	5	1,025	28	62 74	36 75	.....	50 00	.....	.....
Waterloo, South	518	510	16	3,410	99	161 45	126 50	.....	50 00	...	78 40
Welland	187	235	8	1,345	47	130 97	57 00	.....	50 00	.....	215 24
Wellington, Centre	171	109	5	1,340	25	39 17	26 00	.....	50 00	.....	.....
Wellington, East	203	183	7	2 020	51	22 06	47 75	.....	75 00	.....	.....
Wellington, South	151	171	6	1,300	6	.....	35 00	5 00	75 00	...	.....
Wellington, West	187	112	7	1,800	33	73 36	32 50	.....	50 00	.....	.....
Union	77	54	5	660	17	22 02	13 00	.....	21 75	.....	.....
Wentworth, North	216	173	6	1,470	28	34 02	42 75	.....	50 00	.....	.....
Wentworth, South	251	271	7	1,495	43	154 51	69 25	.....	50 00	.....	.....
York, East	131	132	11	1,066	26	173 93	13 00	.....	50 00	.....	9 10
York, North	51	107	7	505	19	55 71	26 25	.....	50 00	.....	.....
York, West	182	173	6	1,225	36	.....	50 50	.....	50 00	.....	52 00
Total	16,624	16,808	677	119,402	3,133	....	.....	.....	....	.....	.....

FOR YEAR ENDING JUNE 30TH, 1899.—*Concluded.*

Receipts.—*Con.*			Expenditure.											
Miscellaneous.	Balance due treasurer.	Total receipts	Due treasurer per last report.	Expense for meetings.	Secretary's salary, etc.	Postage and stationery.	Printing.	Advertising.	Lecturers' expenses.	Lecturers' allowance.	Periodicals for members.	Miscellaneous.	Balance on hand.	Total.
$ c.	$ c.	$ c.	c.	$ c.	$ c.	$ c.		c.	c.	$ c.	c.	c.	$ c.	$ c.
.....	.....	147 39	.....	24 75	33 60	6 80	6 25	11 25	13 25	.....	.....	36	51 13	147 39
.....	.....	68 45	.....	7 00	12 00	3 26	5 00	.....	....	.....	....	8 25	32 94	68 45
.....	.....	49 25	3 64	5 34	.....	4 50	8 27	4 25	.....	.....	.....	17 73	5 52	49 25
.....	3 49	82 05	15 73	14 45	20 00	5 82	5 25	3 75	.....	.....	....	17 05	.....	82 05
.....	....	94 53	5 00	15 45	15 60	1 57	10 50	.....	.....	.....	.....	6 00	41 01	94 53
.....	.....	149 55	.....	26 50	35 00	7 02	9 11	4 50	4 62	.....	.....	.....	62 80	149 55
50	.....	152 92	.....	.....	52 90	2 81	17 25	5 00	23 25	.....	.....	24 55	27 16	152 92
.....	....	202 20	.....	93 75	25 00	6 64	21 00	..	12 80	.....	.....	.....	43 01	202 20
.....	.....	124 68	.....	37 00	18 00	3 75	7 50	1 00	9 60	.....	.....	.....	47 83	124 68
.....	.....	594 10	.....	34 25	71 05	17 79	46 85	21 25	114 05	86 50	.....	17 85	184 51	594 10
.....	..	155 67	.....	3 75	17 35	18 01	21 25	34 00	37 20	.....	.....	..	24 11	155 67
.....	.....	73 64	.....	5 00	20 00	4 50	15 80	.....	13 55	.....	.....	2 00	12 79	73 64
3 20	.....	194 72	.....	36 00	31 55	12 33	.....	33 02	20 95	.....	.....	4 64	56 23	194 72
.....	.....	92 58	.....	24 15	15 00	3 40	5 00	6 25	.....	.....	.....	6 00	32 78	92 58
.....	.....	80 96	.....	36 25	15 00	4 50	8 25	.....	.....	.....	.....	.....	16 97	80 96
6 10	.....	439 20	.....	32 75	35 00	11 49	56 25	.....	31 00	.....	41 10	.....	231 61	439 20
.....	.....	327 15	.....	28 80	27 00	6 25	17 00	32 75	34 85	11 09	.....	13 10	156 40	327 15
.....	.....	178 00	.....	44 40	20 00	8 25	15 00	17 95	21 25	5 00	.....	20 00	26 15	178 00
.....	.....	133 05	.....	30 45	15 00	2 60	26 41	.....	.....	.....	.....	25 00	33 59	133 05
2 00	.....	135 20	.....	18 25	20 00	5 60	24 00	13 70	6 50	.....	.....	3 20	43 95	135 20
.....	.....	86 22	.....	7 00	20 00	4 55	18 00	.....	20 40	.....	.....	..	16 27	86 22
1 25	.....	216 62	.....	22 40	25 85	27 14	35 71	....	30 50	.....	31 10	2 60	41 32	216 62
.....	.....	83 65	.....	15 00	20 00	5 70	.....	16 75	14 20	.....	.....	.....	12 00	83 65
.....	.....	167 24	.....	15 60	7 70	2 08	75	17 34	16 40	5 00	.....	40	102 57	167 24
.....	...	107 31	.....	3 50	33 50	3 05	17 75	.....	6 00	.....	.....	.....	43 51	107 31
....	.....	342 61	.....	26 15	32 50	6 75	22 75	9 90	19 95	5 00	12 75	73 00	133 86	342 61
....	.....	205 11	.....	49 40	51 40	10 75	.....	56 85	22 90	.....	.....	50	13 31	205 11
72	...	81 22	23 32	13 65	20 20	3 19	11 00	.....	85	.....	.	.....	9 51	81 22
.....	...	474 03	.....	93 45	102 05	2 02	38 00	40 00	60 00	.....	.....	50 11	93 40	474 03
.....	13 67	118 17	23 67	17 00	35 15	2 50	26 50	.....	13 35	.....	.....	.....	.....	118 17
.....	.....	170 35	.....	8 75	18 35	7 79	23 00	.....	....	.....	.....	30 25	82 21	170 35
.....	.....	128 78	.....	37 65	24 40	5 59	22 75	.....	20 76	5 00	.....	....	12 63	128 78
.....	.....	138 41	.....	16 50	20 00	10 47	22 60	.....	16 54	.....	33 50	4 67	14 13	138 41
.....	.....	149 49	...	16 50	25 00	4 83	10 25	1 00	9 92	.....	.....	15 50	66 49	149 49
6 00	.....	422 35	.....	71 59	80 00	10 37	12 75	5 50	21 95	.....	.....	9 60	210 59	422 35
.....	.....	453 21	.....	44 95	45 70	9 50	8 00	9 00	14 65	.....	111 00	102 00	108 41	453 21
3 75	....	118 92	....	20 00	24 55	3 99	11 00	...	....	....		8 20	46 18	118 92
.....	.....	144 81	.....	13 75	25 00	3 90	30 56	.....	20 17	.....	17 60	6 00	27 83	144 81
10 50	.....	125 50	11 36	4 15	20 00	4 50	10 95	11 80	.....	.....	.....	47 00	15 74	125 50
.....	...	155 86	.	28 75	10 00	3 15	17 75	75	9 85	.....	30 00	75	54 86	155 86
.....	.....	56 77	.....	7 25	15 00	42	9 25	.. ..	9 40	. ....	... ..	.....	15 45	56 77
.....	.....	126 77	.....	25 65	27 00	6 60	18 25	8 00	.....	.....	....	.....	41 27	126 77
....	...	273 76	.....	30 05	10 00	12 34	54 89	....	12 00	.....	.....	.....	154 48	273 76
.....	....	246 03	.....	24 00	20 00	16 28	16 20	.....	..	....	.....	.. ..	169 55	246 03
.....	.....	131 96	.....	.	25 00	4 10	21 70	.....	18 65	.....	.....	5 50	57 01	131 96
6 50	.....	159 00	2 52	20 75	42 40	8 55	24 50	7 00	26 70	....	.....	10 45	16 13	159 00
.....	.....	.	.....	.....	.....	.....	.....	.....	.	...	.....	...	....	.....

SPECIAL NOTICES.

Regarding Work of the Past Year.

The Institutes holding the largest number of meeetings are :

Hastings, North	21	Bruce, West	10
Waterloo, South	16	Perth, North	10
Ontario, North	14	Prince Edward	10
Simcoe, East	13	Lambton, West	9
Middlesex, North	12	Lanark, North	9
Victoria, East	11	Port Carling and Bala	9
York, East	11	Ontario, South	9
		Parry Sound, West	9

The Institute meetings which were the most largely attended were :

	No. of meetings.	Total attendance.
Peterboro, East	6	3,645
Waterloo, South	16	3,410
Middlesex, North	12	2,985
Lanark, North	9	2,895
Bruce, South	6	2,625
St. Joseph Island	7	2,574
Halton	6	2,540
Perth, North	10	2,425
Dundas	5	2,360
Victoria, East	11	2,109
Hastings, North	21	2,054
Simcoe, East	13	2,041
Leeds, South	7	2,035
Wellington, East	7	2,020
Lanark, South	7	2,005

The Institutes having the largest membership to July, 1899, are :

Waterloo, South	510
Hastings, North	438
Halton	417
Peel	416
Ontario, North	406
Lanark, North	365
Middlesex, North	359
Prince Edward	315

The Institutes having the smallest membership are :

Essex, North	43
Union	54
Amherst Island	55
Port Carling and Bala	61
Muskoka, Centre	65
Renfrew, North	66
Addington	67
Muskoka, South	78

INSTITUTE OFFICERS FOR 1899-1900.

ADDINGTON.—President, M. Shannon, Centreville; Vice-President, A. V. Price, Newburgh; Secretary Treasurer, J. B. Aylesworth, Newburgh.

ALGOMA, C.—President, Henry Knight, Sault Ste. Marie; Vice-President, H. F. Hill, Sault Ste. Marie; Secretary-Treasurer, A. W. Penhorwood, Sault Ste. Marie.

ALGOMA, E.—President, Thomas Cordukes, Sowerby; Vice-President, J. Lockore, Thompson; Secretary-Treasurer, J. H. Elliott, Thessalon.

AMHERST ISLAND.—President, Henry Filson, Stella; Vice-President, W. Allen, Stella; Secretary, T. J. Polley, Stella; Treasurer, Samuel Fleming, Emerald.

BRANT, N.—President, H. R. Nixon, St. George; Vice-President, Morley Howell, St. George; Secretary-Treasurer, Cyrus Griffith, St. George.

BRANT, S.—President, D. G. Hanmer, Burford; Vice-President, E. H. Standing, Burford; Secretary-Treasurer, W. H. Metcalf, Burford.

BROCKVILLE.—President, William Neilson, Lyn; Vice-President, Elgin Row, Brockville; Secretary-Treasurer, R. H. Field, Addison.

BRUCE, C.—President, D. N. McIntyre, Paisley; Vice-President, R. H. Rowan, Glamis; Secretary-Treasurer, O. H. Nelson, Paisley.

BRUCE, N.—President, Cecil Swale, Wiarton; Vice-President, John Heath, Hope Bay; Secretary-Treasurer, Peter Anderson, Hepworth Station.

BRUCE, S.—President, Henry Arkell, Teeswater; Vice-President, A. E. Sherrington, Walkerton; Secretary-Treasurer, James A. Lamb, Walkerton.

BRUCE, W.—President, Alfred Brunton, Tara; Vice-President, John George, Port Elgin; Secretary-Treasurer, John Douglass, Tara.

CARLETON.—President, J. G. Clarke, Ottawa; Vice-President, John Craig, North Gower; Secretary-Treasurer, R. H. Grant, Hazeldean.

CORNWALL.—President, J. L. Groves, Cornwall Centre; Vice-President, D. A. A. McDonald, Harrison's Corners; Secretary-Treasurer, C. W. Young, Cornwall.

DUFFERIN.—President, W. J. Craven, Shelburne; Vice-President, O. L. Fewester, Horning's Mills; Secretary-Treasurer, William Hudd, Horning's Mills.

DUNDAS.—President, F. E. Farlinger, Morrisburg; Vice-President, W. H. Casselman, Chesterville; Secretary-Treasurer, J. P. Fox, Winchester.

DURHAM, E.—President, T. A. Kelley, Millbrook; Vice-President, J. W. Martyn, Canton; Secretary-Treasurer, W. Vance, Millbrook.

DURHAM, W.—President, J. M. Joness, Bowmanville; Vice-President, Norman Allen, Newcastle; Secretary, H. C. Hoar, Bowmanville; Treasurer, W. E. Pollard, Bowmanville.

ELGIN, E.—President, L. C. McConnel, Lakeview; Vice-President, W. C. Lewis, Orwell; Secretary-Treasurer, Francis Leeson, Aylmer.

ELGIN, W.—President, Edgar Silcox, Shedden; Vice-President, James Jameson, Rodney; Secretary-Treasurer, Arch. McColl, Aldboro'.

ESSEX, N.—No report.

ESSEX, S.—President, J. C. Shepley, Kingsville; Vice-President, A. H. Woodbridge, Kingsville; Secretary-Treasurer, G. W. Coatsworth, Kingsville.

FRONTENAC.—President, Joshua Knight, Elginburg; Vice-President, John Clow, Harrowsmith; Secretary-Treasurer, Alex. Ritchie, Inverary.

GLENGARRY.—President, M. A. Munro, Glen Roy; Vice-President, R. A. McDonald, Greenfield; Secretary-Treasurer, W. J. McNaughton, Lancaster.

GRENVILLE, S.—President, Robert Alder, Prescott; Vice-President, Lanson Lockerbie, Ventnor Secretary-Treasurer, James Bennett, Spencerville.

GREY, C.—President, John Irwin, Red Wing; Vice-President, J. M. Davis, Vandeleur; Secretary-Treasurer, J. I. Graham, Vandeleur.

GREY, N.—President, Malcolm Rutherford, Leith: Vice-President, W. J. Saunders, Box 814, Owen Sound; Secretary-Treasurer, James Smith, Inglis Falls.

GREY, S.—President, Robert Morice, Orchard; Vice-President, James Allan, Varney; Secretary-Treasurer, George Binnie, Bunessan.

HALDIMAND.—President, N. H. Wickett, York; Vice-President, Robert Buckley, Cheapside; Secretary, R. E. King, DeCewsville.

HALTON.—President, D. Robertson, M.D., Milton; Vice-President, George Gastle, Milton; Secretary-Treasurer, J. L. Warren, Acton.

HASTINGS, E.—President, Arthur McFarlane, Melrose; Vice-President, Tom Way, Chapman; Secretary-Treasurer, John L. Clapp, Corbyville.

HASTINGS, N.—President, Robert S. Allen, Cooper; Vice-President, Henry S. O'Hara, Madoc; Secretary-Treasurer, J. G. Foster, Moira.

HASTINGS, W.—President, John A. Holgate, Foxboro'; Vice-President, J. S. Dench, Trenton; Secretary-Treasurer, B. Mallory, Frankford.

HURON E.—President, Thomas Strachan, Brussels; Vice-President, W. H. Fraser, Bluevale; Secre-Treasurer, George Hood, Sunshine.

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MANITOULIN, W.—No report.

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WOMEN'S INSTITUTES.

Rules and Regulations.

1. The formation of women's institutes shall be permitted, one for each district as given in Schedule "A" of the "Act and Rules Governing Farmers' Institutes."

2. The organization meeting may be called by the Superintendent of Farmers' Institutes, by the head of a municipality, by the president and secretary of the local farmers' institute, or by any five ladies of the district. At least two weeks' notice shall be given by advertisement in two newspapers published in the district or by placard, in which shall be stated the object, time and place of meeting; see clauses 5, 6, 7 and succeeding clauses of the "Rules and Regulations Governing Farmers' Institutes."

3. The rules governing Farmers' Institutes (except clauses 1, 2, 4, 30, and 72) shall govern the women's institutes.

4. The object of women's institutes shall be the dissemination of knowledge relating to domestic economy, including household architecture, with special attention to home sanitation; a better understanding of the economic and hygienic value of foods, clothing and fuels, and a more scientific care and training of children with a view to raising the general standard of the health and morals of our people.

5. Each women's institute shall be in affiliation with the farmers institute in the district.

6 Each women's institute shall receive a grant of $10.00 annually from the Department on condition that an equal sum be granted by the County Council or municipalities in which the institutes organized, or from the local farmers' institute and on such further conditions as are imposed by the "Act and Rules, Governing Farmers' Institutes."

7. In addition to the annual meeting, each women's institute shall hold at least four meetings each year, at which papers shall be read and addresses delivered dealing with topics as set forth in clause 4.

8. Each member of each women's institute shall receive each year a copy of one or more publications dealing with some subject set forth in clause 4.

Under the above rules and regulations two institutes have already been formed, one in South Wentworth and one in South Ontario. The second annual report from the South Wentworth Women's Institute is printed below. No report has yet been received from South Ontario. These institutes are both doing excellent work, and it is expected similar institutes in other districts will shortly be organized.

REPORT OF THE SALTFLEET WOMEN'S INSTITUTE.

By Miss M. E. Nash, Secretary, Stony Creek, Ont.

The Women's Institute of Saltfleet has completed its second progressive and successful year. Thirteen regular meetings have been held, which were varied, interesting and instructive. The papers given by the members were as follows: Four papers from the physiology on "The Bones and Muscles," with illustrations to explain, by Mrs. M. H. Melson; a paper on "Sugar and Salt," by Mrs E. D. Smith; "A Talk to Girls," by Miss Nettie Miller; "Wandering Thoughts," by Mrs. G. Miller, jr.; "Bending the Twig," by Miss H. Corman; "Hints for the Institute," by Mrs. G. Miller, jr.; "A Good Education" by Miss F. Pettit; "Out-door Rose Culture," by Mrs. E. D. Smith; "The Country Home," by Mrs. F. M. Carpenter; "Clubs for Women," by Mrs. J. H. McNeilly. Several of these papers have been printed in the leading home magazines. Besides papers given by the members, a number of excellent addresses have been delivered by foreign talent. These addresses were as follows: "Neglected Backs," by Dr. Mabel Henderson; "The Work and Scope of Cooking Schools and the Advantage of Studying Food Principles in Relation to Cookery," by Mrs M. C. Bradley; "Our Daily Bread," by Mrs. J. Rose-Holden; "Physical Culture and Hygiene," by Prof. W. A. Watkins; "Higher Physical Life of Women," by Miss Lillian F. Staples M. L. A. Mrs. Hoodless addressed the Institute and explained the benefits which would be derived from affiliating with the Local Council of Women.

During the year the Institute has affiliated with the Farmers' Institute and the Local Council of Women. A very interesting open meeting was held on the evening of January 26th at which an address was given by Mrs, J. L. Smith of Whitby, subject—"A Talk to Young Farmers and their Wives." Miss Laura Rose, of the Ontario Agricultural College, Guelph, gave an interesting talk on "Bread and Butter Making." Two papers were given by members of the Institute, "The Modern Girl," by Mrs. S. H. Melson, and "As the Twig is Bent the Tree Inclines," by Miss H. Corman. These meetings are varied with music, readings, recitations, etc. A demonstration lecture in cooking, by Mrs. M. C. Bradley, of Hamilton, was of interest and benefit to the Institute.

The members still find the Chautauqua Course in Domestic Science very instructive. The Question Drawer is one of the chief features of the regular meetings, as there is considerable information derived from it. The membership of the Institute is quite encouraging, there being sixty-one paid members on the roll.

The President, Mrs. Erland Lee, declined re-election. The following is a list of the officers for the ensuing year,—Honorary President, Mrs. John Hoodless; President, Mrs. E. D. Smith; 1st Vice-President, Mrs. S. H. Melson; 2nd Vice-President, Mrs. F. M. Carpenter; Secretary, Miss M. E. Nash; Treasurer, Mrs. J. H. McNeilly; Reporter, Miss L. King.

We are looking hopefully to the coming year and are quite confident that it will be one attended with much prosperity.

FINANCIAL STATEMENT OF THE SALTFLEET WOMEN'S INSTITUTE FOR YEAR ENDING JUNE, 1899.

Receipts.

Balance June, 1898	$ 17	95
Oct. 13,—Members' fees		25
Jan. 26,—Entertainment	11	45
Feb. 6,—From Council	10	00
Feb. 6,—Tickets sold		45
Feb. 6,—Members' fees	4	25
Apr. 13,—Mrs. Bradley, Tickets	7	10
May 30,—Members' fees	2	25
Total	$ 53	70
Total Expenditure	$ 39	01
Balance	$ 14	69

Expenditure.

Oct. 4,—Prize on Bread	$ 2	00
Prize on Bread	3	00
Nov. 25,—Rent, hall	6	00
Jan. 26,—Mrs. Smith	5	25
" " Hall	2	00
" " Printing	1	50
" " Telephone		53
" " Postage		41
Feb. 9,—Dr. Henderson		25
" " Postage		63
" 24,—Rent, hall	6	00
" " Affilation fee	2	00
Apr. 13,—Mrs. Bradley	7	92
" " Tickets H. G. B		75
" " Telephone		15
" " Postage		62
Total	$ 39	01

CARLOTTA ORR,
CLARA THOMPSON, } Auditors.

URSULA McNEILLY,
Treasurer.

* This balance includes $8.50 for fees of some members for year ending June, 1899,

LIVE STOCK DEPARTMENT.

THE PRODUCTION OF BACON FOR THE BRITISH MARKET.

The great expansion of dairying in Canada of late years has, as a natural sequence, brought about a corresponding increase in swine breeding and feeding in this country. Almost contemporaneously with this development of the swine industry came into existence a change in the type of the hog most in demand both for shipping purposes and for home consumption. The big, fat, thick hog, which it was once the aim of every breeder to produce, had to give way to a pig of quite a different build, one possessing plenty of length, greater depth than formerly, with a corresponding decrease of width of back, lighter in the shoulders and with less weight of jowl; all these characteristics being accompanied by a less amount of fat interspersed with the lean meat.

This change in the conformation of our hogs was brought about by the efforts of our pork packers to secure a market in Great Britain for our surplus bacon. At first the consignments consisted of bacon and hams from the old style of pig, as there were none then of the kind now so popular to be obtained in this country. It was soon found, however, that the British taste desired meat of a leaner nature, and so some enterprising breeders and some of our pork packers took steps to meet this demand by importing animals of the type which the British bacon curers pronounced the ideal ones for their purpose.

The importation of these pigs gradually worked a revolution in the conformation of the swine in this country, especially in Ontario, which province was the first to receive the benefit derived from this change. The thick, fat hog has now pretty well fallen into disrepute everywhere, and, except for the lumber shanties, its fat carcase is no longer in demand, and is subject to a heavy discount in the markets when it is placed on sale.

At first the advent of these new breeds (new, that is, to Canada) was not heartily welcomed. It is true that there was a pretty steady demand for them, but it was, in the beginning, rather the demand which always arises for something new than the recognition of the value of these pigs to this country. Then again, there was the determined opposition of breeders of old established breeds to overcome, who could see no merit of usefulness in the new type of hog. Time, however, wrought wonderful changes, and now we see these same breeders devoting their best efforts, and with considerable success, to mould their pigs into the style called for by the packers, while the agricultural press and teachers and lecturers on swine breeding all dwell on the importance of breeding only such pigs as conform to the requirements of the packers.

The consequence of all this co-operation is seen in the great increase of our export trade in bacon with Great Britain. Our bacon is fast displacing the Danish in the markets of the Old Country, and would do so much more rapidly if Canadian breeders took care, in the first place, to feed only the right kind of hog, and next, to feed only such food as will make firm bacon of the best quality. The method of feeding and curing employed in Britain secures for the home-grown bacon considerably better prices than can be obtained for ours. There is no reason, however, why we should not, by employing better methods, get as good prices for our product as the British feeder does. While many Canadian feeders are quite up-to-date in this respect, too many are careless about their swine, as regards the type of pigs, the feed given them, and the proper time to finish them for the market.

It is with a view of assisting such that this article has been prepared. It aims to give practical, well-established facts about bacon hogs and the feeding of the same. Some of the most prominent pork packers in Ontario have written special articles on the subject, and, in connection with these articles will be found numerous illustrations of desirable and undesirable types of bacon hogs, and of the products of the same. It is hoped that a study of these may show the enquirer what type of pig he should handle and what he should avoid.

The Type of Pig Required. The type of pig which the bacon-curers engaged in the export trade to Great Britain find the most profitable in their business is one of great length and depth, light in the shoulder and jowl, (which are cheap cuts) not too wide in the back, and carrying its width evenly along from shoulder to tail. This ensures a deep, long ham instead of the thick short one which used to be so general. The back and belly should run in as straight lines as possible. This, with the depth of side, enables the curer to produce the famous Wilt-

shire bacon or sides, so called from the particular way it is cut, which form of bacon is so esteemed in Great Britain at the present time. When a feeder gets a pig of this type he will find, provided he feeds it suitable food, that he will get a "fleshy hog" as opposed to a "fat" one. Fat hogs are not desired, and all that exceed one and a half inches in thickness of fat on back will net a lower price than such as are within that standard. The most desirable weights for bacon hogs are from 160 to 190 pounds, or thereabouts, which weights can be reached when the pig is six to eight months old. And here is a point where the interests of the feeder and bacon curer are quite identical, for pigs up to those weights give a larger increase of weight for the amount of food consumed than those fed to reach heavier weights.

Breeds which Approximate to this Type. As it is the pork packers who have to consult the tastes of British consumers, they are the best judges of what breeds are most serviceable to produce pigs of the required type. Accordingly, we find that they recommend the use of Yorkshires and Tamworths as being pre-eminently fitted for the production of bacon hogs, while Berkshires of the newest type and Chester Whites are also suitable. The other breeds are not so well fitted at present, but, as said above, breeders of these breeds are strenuously endeavoring to bring their pigs into line, and sows of these kinds when crossed with boars of a more developed bacon type, produce good bacon pigs that are easy feeders. For feeding purposes cross-bred swine and grades generally give better results than the purebred. Among the crosses that have given especial satisfaction are the Yorkshire-Berkshire and the Tamworth-Berkshire.

As a corroboration of the packers' recommendation of Yorkshire grades as being what is wanted, it may be added that Armour & Co., Chicago, purchaaed 150 pigs of that breeding in Canada, slaughtered them at their establishment, and sent the bacon from them over to England, where it sold readily at a substantial advance over bacon made from hogs bred and fed in the United States.

The Most Suitable Foods for Bacon Hogs. Here we meet with our first difficulty. We know the type of hog whose carcase will give the cuts sought after by the British consumer, and our packers know exactly how to cut them up, but we are still somewhat in the dark as to the best and most economical foods for producing a nice lean breakfast bacon. There have been several experiments in pig feeding it is true, at our Experiment Stations, but all of these, till quite lately, have been in the line of determining which foods produce the greatest gain at the least cost, irrespective of the quality or firmness of the meat. Investigations are now, however, proceeding which we hope will, in time, determine the rations which will give us bacon of the quality and flavor desired, and the respective cost of each different kind per pound of increased gain. Prof. Day, of the Guelph Station, has already given us the results of his first experiment in this line which will be found below.

Although we cannot at present state definitely the most suitable food for bacon hogs, yet there are certain foods which have invariably given good results, and, in the present state of our knowledge, it will be perfectly satisfactory to use them until more definite information is available. On the other hand, it is possible to point out certain rations which it would be well for all feeders for the British markets to avoid, inasmuch as their use has resulted in soft, flabby bacon, which is not wanted, and the continued production of which will kill our market in Great Britain instead of extending it, as can easily be done by employing the right methods.

Food for the Young Pigs. As with other animals, one of the principal points is to give the young pigs a good start in life. Their first meals are taken through the sow, and, therefore, the latter should be fed nourishing and succulent feed, which should be given in liberal quantities as soon as all danger of milk fever is past. Skim-milk, bran, shorts, ground oats, barley and peas form an ideal ration, but peas should not be fed too heavily at first. It has been stated on authority that each sucking pig at two weeks old takes three pounds of milk per day from its mother. This shows the necessity of feeding her well if she and the youngsters are to do their best. As soon as the little ones show an inclination to drink for themselves, some milk and shorts should be put in a place where the sow cannot get at it. Later on chopped oats can be added. After weaning the pigs, which is best done when they are about eight weeks old, they should be given skim-milk or buttermilk with shorts, or a mixture of ground grains, and be allowed plenty of exercise. At this age green clover is valuable for promoting the growth of lean flesh. This can be either fed in their exercise lot, or they can have the run of a small clover pasture and pick it for themselves, which is the best plan. Each pig will take about one-third of a gallon of skim-milk with the grain mixture. As they grow the latter must be gradually increased, but the milk allowance need not be altered unless there is plenty of milk to spare. Water can be added to make the required bulk. They should never be fed more than they can eat clean, and their feed must not be allowed to get offensive before it is given to them. In the winter time cut clover hay, steamed or soaked for three hours or more, goes a good way towards taking the place of green clover. When swine are fed on grain

only, and are confined in pens, getting very little exercise, the usual result is that they get off their feed and oftentimes lose the use of their limbs. Even if these results do not occur, the meat they put on is not the lean, fleshy kind which ranks highest in the Old Country bacon markets. It must be remarked here, however, that skim-milk or whey, when fed to hogs in confinement, appears to counteract the evil results so generally found. Prof. Day points this out in the report of his late experiment. Where hogs are confined they should have an allowance of sods where they can readily get at them. A mixture of wood ashes and salt, at the rate of one bushel of ashes to six pounds of salt, is another good condiment. A composition recommended by Mr. Theodore Louis is as follows: Six bushels charcoal, broken up into pieces the size of a hazelnut: six pounds salt, one bushel wheat shorts thoroughly mixed, and sprinkled with a pailful of water in which one and a quarter pounds of copperas have been dissolved.

Fattening for the Packing House. While the kind of food fed to the hog during the last few weeks of his life—the finishing off period—has very properly been considered as having a most important bearing on the quality of the flesh, it would seem, nevertheless, that, as regards the firmness or softness of the bacon, the character of the rations given previous to the fattening period has almost an equal importance. In fact, if we are to get "high-class" bacon our pigs must be carefully fed from birth till they are handed over to the packer.

A strong and rather curious corroboration of the importance of feeding properly in the earlier life of the pig is found in Prof. Day's report on the experiments he conducted last summer at the Guelph Experiment Station. Corn and rape have both been denounced as foods tending to produce "soft" bacon. Here, however, we find them fed to pigs in the fattening stage (rape, of course, in conjunction with a grain ration, and in one case in conjunction with corn meal) not only without harm, but with the best results as regards "firmness" of the bacon. The explanation apparently lies in the fact that the pigs thus fed had, up to the time when they weighed 100 pounds or more, been receiving rations such as milk and mixed grains, together with plenty of exercise, and consequently their meat was firm before the corn and rape was fed to them. Further investigation will, no doubt, throw more light on this subject. In the meanwhile it will be well for feeders to use corn and rape but sparingly until their worth for feeding is settled. The unsuitability of corn as a food for bacon hogs, when given as the principal or sole grain feed throughout the *entire* life of a hog, has been frequently demonstrated. Its deficiency in ash keeps back the natural development of the muscles, reduces the blood and some of the internal organs of the body, and causes weakness in the bones.

Unsuitable and Doubtful Foods. Among other grains which the feeder would do well either to let severely alone or use only in very small quantities until their worth for feeding has been thoroughly tested are beans, buckwheat and rye. The first-named have been blamed as the cause of the considerable quantity of soft bacon that has passed through the packers' hands this last summer, and which gave Canadian bacon a temporary bad name in the Old Country markets. This may have been so, as a great many feeders in western Ontario utilized their surplus bean crops in feeding their hogs. It must be borne in mind, in comparing results obtained from feeding bean meal in Great Britain, that their beans are of a different kind from those grown in most parts of Canada. As regards buckwheat, Prof. Robertson has shown by his experiments at Ottawa that buckwheat cannot always be the cause of soft bacon, even when fed alone, while, as regards increase of live weight, it is but slightly inferior to wheat, but it must be remembered that it is heating in character, therefore it is not advisable to use it to any great extent, and then only in conjunction with other and less heating grains. Rye, owing to the fact that so small an acreage of it is now grown in this country in comparison with other grains, has not entered largely into the feeding of hogs, but both rye shorts and rye bran have been tested in Denmark, with the result that their use in any considerable quantity has been found prejudicial to obtaining the best quality of bacon. Rye itself, as regards the gain made in weight, has been shown by Danish experimenters to be equal in feeding value to barley, while as regards its influence on the quality of bacon, Danish experiments also seem to be favorable. In view of the bad results obtained from its by-products, however, it would be well to refrain from feeding it too lavishly until our experiment stations have made further tests of its practical value.

There are other foods which, while their use in reasonable quantities is oftentimes beneficial to the health and well-doing of feeding hogs, are yet quite detrimental to the production of good, firm bacon when pigs in the final fattening stage have to depend on them too much for their sustenance and growth, such as rape, grass, and clover. As we have seen above, Prof. Day used rape in connection with meal as part of the ration fed to hogs in the final stage, not only without bad results, but, apparently, to good advantage. It must not be forgotten, however, that the hogs had been "well grounded," so to speak, as the result of their preliminary feeding, and also that the grain portion of the ration was two-thirds of the whole. Some feeders make the serious mistake of feeding their pigs too "sloppy" a food, that is to say, too much water or

swill is added to the grain. The Danes and Germans long ago found out the unsatisfactory results from thus doing, and therefore lay great stress on having the food just moist enough as to run easily into the trough.

Such in brief are the principal foods which our present experience has shown are either unsuitable to use or must be fed very sparingly until their worth for feeding purposes has been clearly demonstrated. It is quite possible that further tests may show them, under certain conditions, to be possessed of greater value for the production of bacon than has been hitherto ascribed to them.

What to Feed. Prominent among grains serviceable in the final development of bacon hogs comes barley, which in Great Britain and Denmark is valued above all other kinds of grain for that purpose, the bacon resulting therefrom being very sweet in quality and ranking high in standard. It is possible that our barley, owing to the shorter time it takes in maturing its growth, may not have all the valuable properties of the Old Country barley, but nevertheless it has quite proved its suitability as a food for bacon hogs both when fed alone and in conjunction with other grains, such as peas, wheat, oats, corn and shorts. It has been shown, however, by Prof. Henry, of the Wisconsin Station, and others, that it is more economical to feed barley in combination with other grains than singly, the pigs tested preferring the combined ration to one of barley alone. In comparison with corn meal, eight per cent. more barley-meal was required at the Wisconsin Station to produce a given gain. The barley-fed pigs also drank about twice as much water as the corn-fed ones. In one trial it took 471 pounds of barley-meal to produce 100 pounds of gain. Danish experiments show that pigs fed barley throughout made a daily average gain of 1.10 pounds; those fed on corn throughout gained 1.14 pounds per day. When barley was substituted for corn, when the pigs reached 140 pounds in weight the gain was also 1.14 pounds per day, but when barley was fed at the 120 and 160 pounds limit the daily gains were only 1.09 and 1.10 pounds respectively. As in previous experiments, the carcasses of the corn-fed pigs were rated as poor in quality, and while 92 per cent. of those fed on barley alone came into classes 1 and 2, only 62 per cent of those fed corn throughout were qualified for those two classes, and 14 per cent. came in class 4, which were sold at a discount.

Wheat and its By-products. Wheat has a high feeding value practically equal to corn, as regards the amount of gain in live weight, and the quality of meat produced is also good. It is only, however, during an era of low prices for that grain that it can be economically and profitably used for feeding purposes, but goose wheat, and frozen wheat, such as is sometimes obtainable in Manitoba, have been and can be put to good service in feeding swine. The pork produced from frozen wheat at the Ottawa Experimental Farm was rated higher than that made off peas; 15.46 pounds of increase in live weight were obtained there from one bnshel of frozen wheat. It was thought at one time that wheat might be the cause of soft bacon, but Prof. Robertson has proved that such is not the case.

Of the by-products of wheat, the value of shorts or middlings as a food for both young and older pigs, is well known. Trials at the Missouri Station proved middlings superior to corn in the proportion of 108 to 100. A combination of the two was twenty per cent. more economical than the middlings alone. Like other milling by-products, shorts have a tendency to produce soft pork, and therefore, should never be fed except in combination with peas, barley, corn or other grains. If, however, skim-milk or whey is fed in combination with the ration of which shorts form a part, and, in addition, the hogs can get exercise the quality and character of the bacon will not be affected. Bacon from pigs fed exclusively on shorts and bran is darkish in color, and as might be expected from the nitrogenous character of this ration, contains a large amount of lean meat. The Kansas Station in some tests found that bacon thus produced possessed a hard toughness when fried, and also shrank more than corn-fed pork when boiled.

Wheat bran has only about half the feeding value of shorts, and owing to its coarse, fibrous nature is not very suitable for very young animals, but can be used for growing pigs, and also to a slight extent, for animals in the fattening stage, its use tending to keep the bowels in good order. The feeding of too much bran results in a depreciation of the quality of the carcase.

Peas and Oats. Peas, on account of the large amount of protein they contain, make an admirable adjunct to other grains in the feeding of swine. They are best fed ground, although they have given good results where they have been fed whole but soaked for some hours previously. On account of their "heavy" character they should not be fed alone but in combination with barley, oats, corn or other grains. When they are fed as the sole grain ration, both the fat and lean of the carcase is apt to be too hard. Oats are very valuable for both growing and feeding swine, but should always be fed in connection with corn, peas or barley in order to get the best results.

Skim-milk, Buttermilk and Whey. Numerous experiments and practical work done by individual feeders have proved the great value of dairy by-products as part of the rations for fattening swine. There is practically no difference in the feeding value of skim-milk,

buttermilk, or whey, when all three are fed in prime condition, except that, of course, the skim-milk will be richer or poorer according to the care taken to remove the butter-fat in the separator. Five pounds of skim-milk per head a day is an economical allowance in fattening swine over one hundred pounds in weight when mixed grains are fed. Where corn was fed, as in Wisconsin, the best returns were secured with not more than three pounds of milk to each pound of meal. Prof. Robertson has found that one pound of mixed peas, barley and rye is equivalent to 6.65 pounds of skim-milk. The protein and ash in the milk are what are needed to give strength to the bones and develop the muscles sufficiently. As stated above, Prof. Day has shown the marked influence of whey and skim-milk, not only in causing rapid and economical gains, but in producing a fine quality of bacon, even when no exercise is given to the fattening stock, and in counteracting the tendency to softness produced by the too lavish feeding of shorts. The average results of experiments at the Guelph and Wisconsin stations show that 785 pounds of whey are equal to 100 pounds of grain.

Molasses. Molasses have been lately brought into notice as a feed for fattening swine, owing to the results obtained by an experiment in Germany. All the pigs were fed a basal ration of three pounds of buttermilk and twelve pounds of whey per head daily. They were divided into three lots. Lot 1 received barley in addition to the basal ration; lot 2 were fed barley and molasses feed in the proportion of 2 to 1; while lot 3 received barley and molasses feed in equal proportions. Two pounds of the additional feed were fed daily at first, which was gradually increased to four pounds.

The average daily gain in weight of the three lots was practically the same, ranging from 1.05 to 1.11 pounds. When the carcass was cut up, the fat was found firm and of the best quality. The cost of one pound of gain in live weight was 56 cents cheaper when the molasses feed and barley in equal parts were fed than when barley alone was given. The conclusions reached were that molasses could be advantageously fed to pigs over fifty pounds in weight.

Potatoes. Cooked potatoes can be profitably used with grain for the production of bacon without fear of injuring the quality of the meat. This is proved by both American and Danish experiments. From four to four and a half pounds of potatoes are equal to one pound of grain in pig feeding. Artichokes have the same feeding value as potatoes.

Roots. Eight pounds of mangels or carrots, and about the same weight or a little less of sugar beets, equal in value one pound of grain. This is the consensus of opinion of the Ottawa, Copenhagen, and several American stations. At Copenhagen the mangels were fed finely cut and raw, and even when one-fourth of the daily feed was given in the form of roots no injurious effects were noticed on the quality of the pork. The increase per head in ten days on a ration half grain and half whey, or milk, was 7.6 pounds, whereas when the grain was replaced by roots after the proportion of 1 to 10, the increase was found to be 8.3 and 8.6 pounds. When half the grain was replaced by roots in proportion of 1 to 8 the growth of the different lots was pretty nearly the same, viz., 8.5 pounds for the grain-fed pigs, and 8.6 pounds for those fed roots, thus showing a small difference in favor of the latter. It must be noted that the pigs in this experiment had been fed roots previously, and consequently took them readily.

Bone Meal and Wood Ashes. In experiments conducted by Prof. Henry as to the advantage of feeding bone meal and wood ashes to fattening pigs in combination with corn meal, it was found that the effect of the bone meal and wood ashes was to save about 28 per cent. of the total amount fed to produce 100 pounds of gain live weight. Bone meal doubled the strength of the thigh bones, while ashes were only slightly inferior in value in this respect. The results show the great usefulness of bone meal and ashes, especially where much corn is fed to hogs. In these experiments the pigs had been well started in their development when the trial began. They were divided into three lots of two each. Lot one received corn meal with salt and water. Lot two received in addition hardwood ashes, while lot three was fed a spoonful of bone meal at each feed in place of ashes. In one of the trials, which lasted 112 days, two pigs consumed 10.5 pounds of bone meal and 7.5 pounds of salt, and during the same time two other pigs consumed 33 pounds of hardwood ashes and 8 pounds of salt. The earth in the yards in which the pigs exercised was covered with boards to prevent the animals rooting in it and eating it, as they would otherwise have done, especially those which had no bone meal or ashes to resort to, and, consequently, would have impaired the results of this experiment.

When bone meal was fed 487 pounds of corn produced 100 pounds of gain; when ashes were given, 491 pounds of corn were required, while 629 pounds had to be fed to obtain the same gain when neither bone meal nor ashes were given.

Charcoal. In the corn-growing districts of the Western States corn-cobs are made to serve a good purpose when reduced to charcoal and fed to hogs. Ordinary charcoal is also used by many. The method of reducing the corn cobs to charcoal is thus given by Theodore Louis: Dig a hole in the ground five feet deep, one foot in diameter at the bottom and five feet at the

top for the charcoal pit. Take dry corn-cobs and start a fire in the bottom of this pit, adding cobs so that the flame is drawn to the top of the pit, which will be thus filled with the cobs. Then take a sheet iron cover, similar to a pot lid in form, and over five feet in diameter, so as to amply cover the whole, and close up the burning mass, sealing the edges of this lid in turn with earth. At the end of twelve hours you may uncover and take out a fine sample of corn-cob charcoal. This charcoal can be fed at once if desired, but Mr. Louis prefers to take six bushels of it, or three bushels of common charcoal, eight pounds of salt, two quarts of air-slacked lime and one bushel of wood ashes, breaking the charcoal up well with a shovel or other tool, thoroughly mixing the various ingredients. One and a quarter pounds of copperas is then dissolved in hot water, and with a watering-pot sprinkled over the whole mass, which is again thoroughly mixed. The mixture is then put into boxes and placed where the pigs can get at it at their pleasure. It is not only excellent for the health of the pigs, but is considered by some as a preventive of hog cholera.

Gains Made on Various Foods. One of the latest experiments on combinations of feed for bacon hogs was that held in Wiltshire, England, a short time ago. The results are figured out on the cost of every twenty pounds of increase. Corn meal and separated milk, which cost 4s. 2d. or just 2½d. per lb., gave the best results as regards increase of weight alone. Next came corn meal and bran, costing 4s. 5½d.; corn meal alone, 4s. 6¾d.; corn meal and pea meal, 4s. 7½d.; corn meal and bean meal, 4s. 11d.; barley meal and bran, 5s. ¾d.; barley meal alone, 5s. 1¾d.; barley meal and separated milk, 5s. 3d. The value of the foods used was as follows:—Barley meal, £5 per ton; corn meal, £4 10s.; bran, £4; pea meal, £7 15s.; separated milk, 1d. per gallon.

The carcasses of the pigs were subsequently tested by experts and perfection being represented by 1,000, were graded as follows:—Those fed on barley meal and bran, 990; on barley meal and separated milk, 988; on barley meal alone, 974; on corn and bran 964; on bean meal, 951; on corn and milk, 939; on corn alone, 939; and on corn and pea meal, 908.

The highest average in weight was made by pigs fed on barley meal and separated milk, next to them coming those which had been fed on corn meal and milk. The barley-fed pigs in every instance showed a greater increase than those which had been given a ration of corn meal, either alone or in combination with other foods. A great many of the pigs fed corn and pea meal grew so slowly that the pigs were graded as small. The corn-fed pigs, as usual, turned out too fat. Separated milk was found to be the most valuable food that could be added to corn or barley as regards increase of weight, decrease of shrinkage in the dressed carcass and improvement of the quality of the meat, being only surpassed in this latter particular by bran. Bran thus showed up better than in some experiments which have been conducted on this side of the water. It is not safe, however, to lay too great stress on the results of a single experiment, and it may be that the bran used was obtained from one of the old-fashioned grist mills, and was thus more valuable than the general run of bran nowadays.

As regards an ideal pig food, the conclusions reached from these experiments placed the various rations in the following order: Barley meal and separated milk 903 (perfection being again represented by 1,000); corn meal and separated milk 877; corn and bean meal 590; barley meal alone 519; corn and pea meal 486; corn meal alone 484; barley meal and bran 449; and corn meal and bran 404.

Experiments at Ottawa. The Central Experimental Farm, Ottawa, recently held a three-months' test of various feeds given to swine that were purchased for the occasion. The pigs were part Tamworth and part Berkshire. Nothing was known of the kind of feed given them before the test. The pigs numbered 44 and were divided into 11 lots of 4 apiece. Lot No. 1 received whole corn dry; lot 2, ground corn soaked for 30 hours; lot 3, the same with the addition of milk; lot 4, half whole corn, the balance equal parts of oats, peas, and barley whole and dry; lot 5, the same grains but ground and soaked; lot 6, the same as lot 5 with milk added; lot 7, whole oats, peas and barley in equal parts, fed dry; lot 8, oats, peas and barley in equal parts by weight, ground and soaked for 30 hours; lot 9, the same with milk added; lot 10, half bran, the remainder equal parts of oats, barley and peas ground and soaked; lot 11, 1-5 clover, 4-5 peas, barley, oats and bran ground and soaked, the clover being soaked with the grain.

The pigs were shipped to the Wm. Davie Co., Toronto, and on their arrival alive were graded as follows: Lot 1, one light, one small and two straights; lot 2, three straights, one fat; lot 3, four fats; lot 4, three straights, one fat; lot 5, one straight, three fats; lot 6, three fats, one straight; lot 7, three straights, one fat; lot 8, three fats, one straight; lot 9, two fats, two straights; lot 10, one light, three fats; lot 11, two fats, two light small.

After the pigs were slaughtered Mr. Flavelle graded the carcasses thus, as regards fatness of the backs: All of lot 1 were of No. 1 quality; of lot 2, two reached No. 1 grade and two No.

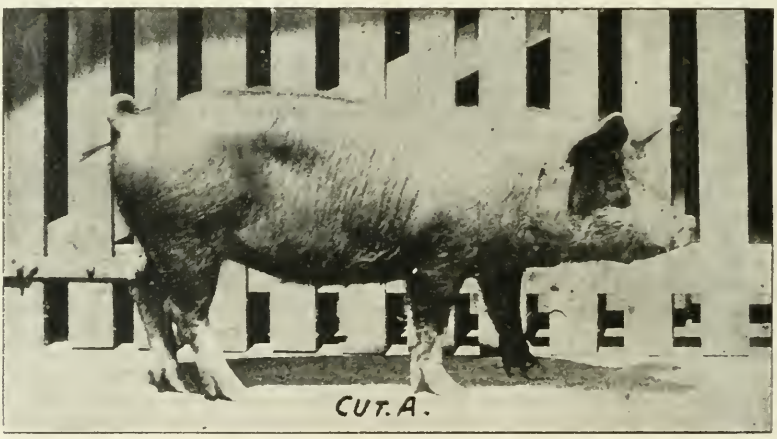
2 ; all of lot 3 were classed as No. 2 ; lot 4 were equally divided between No. 1 and No. 2 ; three of lot 5 got no higher than No. 2, the fourth being No. 1 ; two of lot 6 were in the highest class and two in No. 2 ; all of lot 7 were of first quality ; only one of lot 8 was good enough for No. 1, the other three being seconds ; lot 9 was equally divided between the two grades, but three of the pigs in lot 10 were only of second quality, the other coming in No. 1 ; all four in lot 11 were classed as No. 1. The prices that pigs would fetch were : Straights, $4.62\frac{1}{2}$ per cwt. ; fats, $3.75 and lights $4.25.

A noticeable feature in this test was that the feeding of corn, except when milk was added to it, gave fairly satisfactory results all through. The best lots were Nos. 2, 4 and 7.

HOW THE PACKERS VIEW THE SITUATION.

Facts for Swine Feeders to Ponder Over.

If "line upon line and precept upon precept" are effective, we ought now to have the best kind, and the best fed bacon hogs in the world, as we know of no country where so much on the above subject has been published in the general and agricultural press, and where the Governments, both provincial and federal, have aided breeders so much by experiment and advice, as has been done in Canada. Unfortunately, those standing most in need of the information are that class of farmers who do not take an agricultural paper, and look with contempt on those advanced farmers who have spoken at the Farmers' Institutes. We are free to admit, however, that within the last five or six years the farmers of Ontario, speaking generally, have ably seconded the packers' efforts by trying to produce the quantity and quality desired. There is still, however, much room for improvement.



Cut A.—Too thin. A sample of thousands of unfattened hogs sold by the farmer at a loss to himself and with no satisfaction to the packers.

Interests of Farmer and Pork Packer Identical. It cannot be too often stated that the interests of the pork packer and the farmer are one, and that as these two produce an article for export of high excellence, so as to command the best price in England, so the whole country is benefited, or the reverse if through bad judgment or carelessness an inferior article is produced. Therefore every farmer who breeds and feeds with the result that the finished product from his hogs is a second rate article, inflicts a needless loss upon the whole country. He may succeed in passing off his hogs at the best price, but this does not alter the fact that the

net return to the country is smaller by reason of the faulty article which he has produced. The amount of this loss is to be multiplied by the number of careless, indifferent, unintelligent farmers, who persist in raising stock, the product of which sells at a lower price than the best.

Cut B.—Too thin. The pig shown in Cut A after killing.

We are sorry to report that there are still a large number of pigs marketed that, no matter at what price they are bought, entail a loss on the drover, the packer, the storekeeper in England, and on the consumer, besides injuring the reputation of Canadian bacon, for though no packer of any reputation will put his own brand on the sides or on the boxes of such bacon, it is known by the buyer to be Canadian product, and, of course, the good name which has been so painfully and laboriously secured suffers.

In this particular connection we are referring to the pigs that are sold by farmers to drovers that are simply not fattened at all, and are nothing more than stores. A sample of such is seen in the three cuts marked A, B, and C, which shows the animal alive and dressed.

There you have the pig alive, weighing 145 lbs. Then after being killed, dressed and salted, and ready for packing, what is it? "Skin and misery," as the London dealers call it. If that pig had been fed to about 170 or 175 pounds, or possibly a little heavier, it would have been a very useful animal.

Cut C.—Too Thin. Side cured ready for shipment. Side of pig shown in cut A.—Note the slight thickness of fat on the back, considerably lower than the standard.

Lean and Fat Hogs. It appears to be difficult to make some persons understand what we mean when we say we want lean hogs. They appear to think we mean skin and bones—we mean hogs whose nature it is to turn their food into lean instead of fat and lard.

It is true that the objectionable animals are but few in number in comparison with the whole, but they make themselves felt so severely because they suit no one, and if buyers get them for half price they are still dissatisfied. These small hogs are culled out in Chicago, and go by the name of "pigs."

If this should meet the eye of drovers, we should strongly urge them not to buy this kind at any price. We are aware that some farmers insist on selling all or none, but that ought not to influence the buyer.

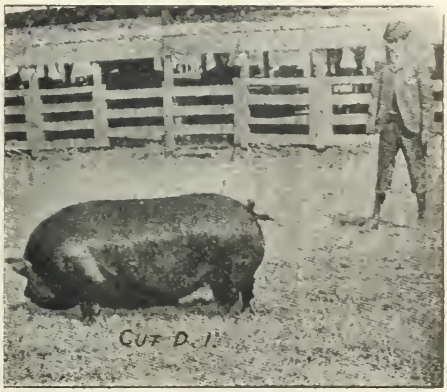
Now, lest the foregoing should lead any farmer to the other extreme, we show photos of animals that are too fat. See illustrations D. E. and F. D. (1) is a cut of a prize pig taken on the Exhibition grounds, Toronto. The photo of D (2) was taken at our packing house; in the latter and in cuts E and F you have a hog weighing 200 pounds alive; the same animal dressed and split, and a side of the same cured and ready for shipment. As a rule, the bacon from such a pig will have to be sold, say, an average of five shillings per 112 pounds less than prime lean, and, of course, we, in self-defence, are compelled to discriminate against it, which we do by paying less by one-fourth cent to one cent per pound according to the condition of the market in England. We would in the strongest manner possible urge feeders not to keep them so long at the trough. They stand in their own light by so doing. Every year it is more difficult to sell fat bacon, and we are safe in saying that the fat hogs we buy are "thieves and robbers," they are drones in the hive; they rob the prime, well-fed, fleshy sides.

Besides, these hogs rob the feeders, as careful feeding experiments have shown they do not give as good a return for the food consumed after they get into ripe condition. We are aware that the popular idea is the opposite, but repeated experiments prove the truth of this statement.

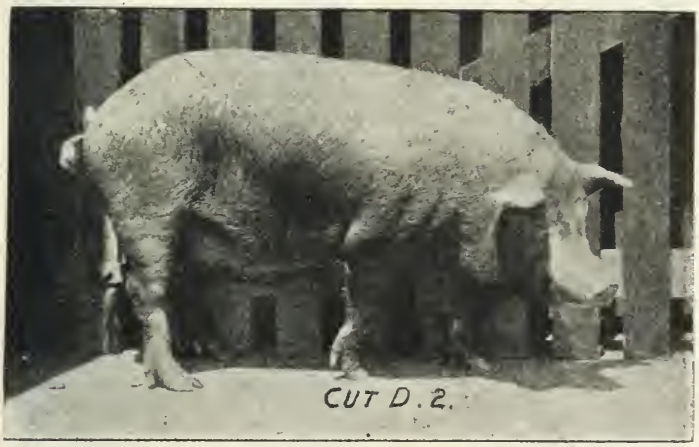
But there is another kind of pigs that are doing us and the country at large a world of injury. We refer to prematurely-finished pigs weighing 145 to 160 lbs. live weight. The nearer they are to the lower figure, the more objectionable they are. As regards quality, no fault can be found with most of them, in fact

they are simply beautiful to look at, and to use an ungrammatical and common expression, no doubt "eats well," but the size is objectionable to buyers, and not a side made from hogs of this weight can be sold on the London market. That manufacturer, or farmer, or vendor is wise who produces for his customers what they want, and are willing to pay a good price for; and that man is not wise who tries to force on buyers goods they don't want.

This class of hogs is a very serious trouble and loss, and the product can only be sold in moderate quantities in one or two districts, and when there is a surplus over what these districts can absorb the price goes down many shillings per cwt. Therefore, we appeal to farmers not to produce this kind, or in other words not to force them. On the question of feeding, and science of breeding, we wish to avoid being dogmatic, positive and dictatorial, but our opinion is that these little, objectionable, well-fed pigs come about by being shut up and fed forcing food from infancy, which produces a finished animal of light weight in four months.



CUT D 1.—Too fat. Taken at the Toronto Exhibition.



CUT D 2.—Too fat. Mark the heavy shoulder.

This style of pig is shown in cuts G. H. and I., and they clearly show to everyone who reads the foregoing how objectionable they are, and what a serious menace to the business.

These light medium and fat hogs are culled out in all American markets, and go by the name of "skips," and always sell very low. They are sometimes called "block hogs," as butchers in New York buy them, when they are cut up on the block for fresh pork. They are altogether too light for bacon, and we earnestly hope that Canadian farmers will set their faces against them. The discrimination against them will be increasingly severe.

Mr. Wm. Harris, the hog buyer at the Toronto Cattle Market, has just returned from a trip across the Atlantic. He visited the leading bacon-cured houses in Ireland, and was struck with the depth of body of the Irish hogs as well as length, and realizes more than ever the short-comings of Canadian hogs, and that it is caused by farmers here finishing them too quickly. They do not get time to grow and develop. No doubt much can be done by judicious breeding, raising only for this purpose long-bodied, deep-sided animals, but the craze for marketing early is at the bottom of it.

Soft Hogs. And now we come to the most serious matter of all, a sin, not of omission, but of commission, which has done more injury to the good name of Canadian bacon than anything else during the last five years. We refer to the thousands of soft hogs that have been

marketed, and we attribute it to the hogs being fed on clover and corn, or possibly roots, although we incline to the belief that clover is at the bottom of the trouble. This soft bacon is looked on in England as an abomination.

We give a few extracts from letters of our London agent on the subject :

Cut E.—Too fat—dressed. The thickness of fat on back, especially on the top of the shoulder, causes this carcass to be discounted against as much as 1c. per lb.

"We deeply regret to see so much second and inferior bacon coming along—we have been deluged with this lately. The agony seems to have been prolonged this year : we ought to be right out of it now.

"We are sorry to see that your farmers are still sending in these small hogs in such quantity, and also that there is so much ill-fed, grassy stuff coming. Whatever you do, waken them up. The Danish farmers made the mistake, and the consequence is that they are suffering bitterly for it. Keep your Canadian farmers right up to the mark on feeding.

"Our worst feature is, Canada is smothering us with an extraordinary amount of bad stock, soft seconds, miserable stuff.

"We regret to say that we have a pile of rubbish that we can scarcely give away. We have really overdone the trade with it, and they resent it. We are simply amazed at the piles of this soft, unsaleable bacon that you are shipping us. Work how we will we seem to be smothered with it. The trade is sick to death of it.

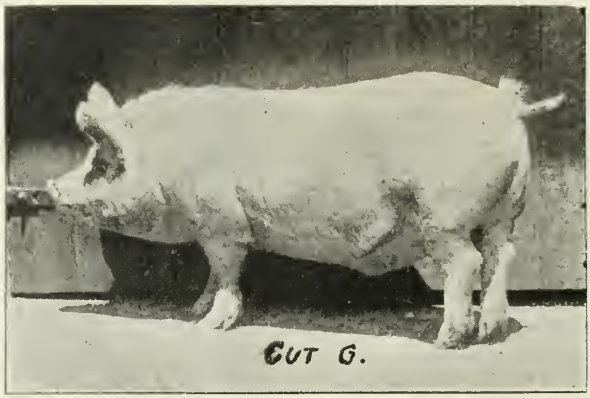
"We are not holding this bacon for price; we are holding it because we are compelled to do so, having no demand from any quarter. They will not have it in South Wales; they will not have it in Bristol; they kick it out of London; and in the South they will have nothing of the kind.

"In the North they tell us frankly they would sooner have good United States bacon than this soft Canadian at 10s. per cwt. less money on account of its softness and oiliness.

"Whatever has happened to Canada! It has done the hog trade a lot of harm and injury, and the sooner it is put right the better it will be for the Canadian trade, or it will soon cease to exist. You cannot sing this song too loudly over Canada; the whole country wants waking up to the danger."

Up to this point all feeding experiments have been made to find out what plan would give the largest percentage of return for the food consumed. We assert that these are worse than useless unless the quality of meat produced be taken into consideration. This is the first and all-important point, and it is impossible to lay too much stress on it. The whole matter is in a nutshell. Canadian farmers receive from ½c. to 2c. per pound more for their live hogs than American farmers, and Canadian bacon brings a proportionate price in England. Why? Because the English are patriots! But because the Canadian is of superior quality, hence it would seem to be wasting words to insist on the necessity of keeping it up to the highest point, and the unreasonableness of expecting to receive this extra premium while we feed trash that produces soft, oily meat.

Cut F.—Too fat. Cured. Side view of part of carcass shown in cut E.



CUT G.—A pig forced from birth.

The Model Bacon Hog. And now, having at length and in detail described the animals that are objectionable, we will try to describe the model hog—the beau ideal.

First, he must be of the right breeding, say a cross of improved Yorkshire or Tamworth, or pure-bred Tamworth, at all events a long-bodied, deep-sided animal, having a small head with light shoulders and good hams, and that when finished, say at six months old, will weigh 170 to 180 lbs., and if a strip is stretched along the back and belly, will show straight lines, and when split will show about 1½ inches of fat all down the back without any hump on the shoulder; it should be thick in belly, and the carcass *full of flesh*. It is easier to explain and particularize what is radically wrong than to enter into details regarding the best. There are scores, nay, hundreds of farmers who are turning out hogs that could not be more even and regular if cast in a mould. They have also learned the best condition for marketing, and we are receiving thousands of such.

That the readers of this may understand and realize the importance of this question, let us suppose that by some despotic act the sizeable prime quality of hogs could not be sold for three months, and the feeding went on as usual and the objectionable hogs continued in their present condition. We venture to say that the export bacon curers would, at the end of that time, refuse to buy a hog, and would forthwith shut up their factories. The prime quality sizeable hogs are the saving salt; it is these that have given Canadian bacon its good name, and without them the undesirable kinds could not be sold at all. We have appealed to the self-interest of farmers; now we would appeal to their patriotism. Let one and all unite in striving to produce the very best and highest priced stock. We are free to admit that Ontario has done well, both in quality and quantity, but the excellence of the best accentuates the worst, and makes the producers of unsuitable hogs the more inexcusable.

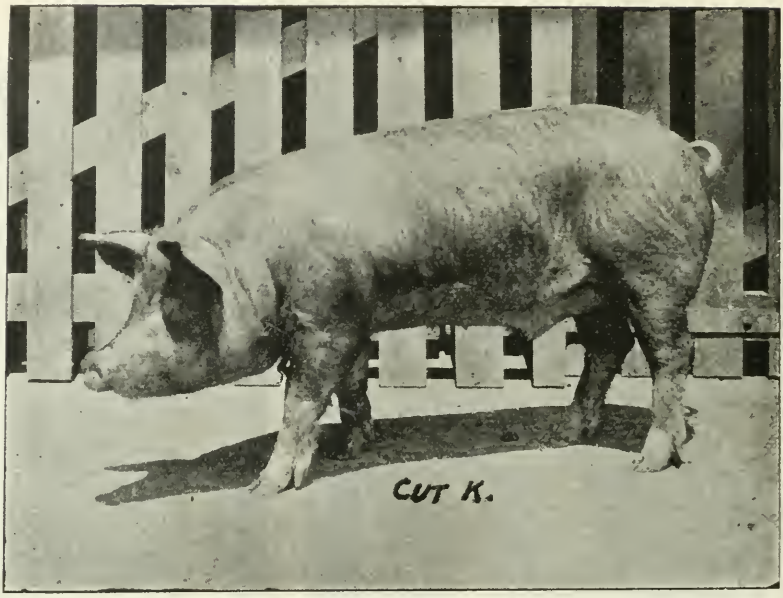
In cuts K, L, M we show a sizeable hog of prime quality, afterwards hanging split, and a side of bacon from the same cured ready for shipment. Readers will notice how even the fat is all down the back, and this is what feeders should aim at.

Quality wanted. To sum up, what the bacon trade wants is quality. This word is comprehensive; it covers style, symmetry, weight and texture of meat, and all the experiments in feeding, whether by individual farmers or at the Government Experimental Farms, are worse than useless—they are mischievious, unless this is not only included but made the prominent feature.

We take this opportunity of assuring Canadian farmers that unless they do their part in judicious feeding for quality the present happy condition of things cannot last; Canada holds no patent on it. To what condition do we allude? When we were paying 6c. for live hogs they were being sold in Chicago and in Buffalo at $3.75 to $4, and even to-day, at the reduced price, of say 4¾c. for No. 1, we are offered Northern Michigan pea-fed hogs in Buffalo at $4.10 to $4.15. Further, we can assure you the pork packers and state agricultural colleges and societies of the United States are not asleep They have had for several years a very impressive and startling object lesson before them, and they are making great efforts to improve their style of hog feeding.

CUT H.—Forced pig, dressed,
Too thick and fat.

CUT I.—Side of forced pig, cured.
Too thick and fat.



CUT K.—The Packer's Model.

Last winter the Armour Company imported into Chicago a car of prime Canadian hogs that they might analyze and study them in detail, and are urging American farmers to copy us in feeding and breeding.

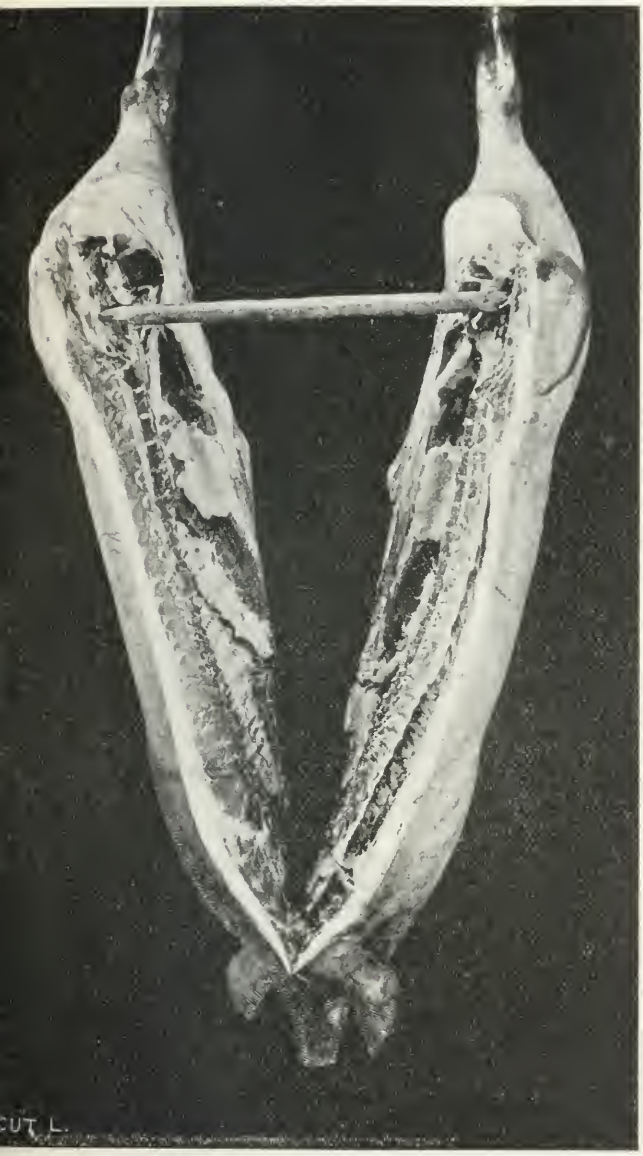
Americans Catering for the British Markets. Only lately we had a letter from the principal of an agricultural college in the United States, seeking information along these lines. Now consider what will follow: American packers will select and buy hogs of the Canadian type fed in certain localities. They will make special efforts to get the product of these hogs into the London market at a trifling advance over the ordinary American. The shop-keepers will find it to be of excellent quality and will substitute it for Canadian, putting the extra profits in their pockets, and thus, unless the quality of Canadian is kept up to the highest standard, it will lose its grand position and never regain it. Farmers the last few years have found the raising and feeding of hogs the most profitable branch of agriculture, and it would be a great pity to spoil it by criminal carelessness in feeding. Farmers and packers are interdependent. Both should aim at the highest excellence, which will redound to the common good and to the country's prosperity.

How Ireland is Improving Her Pigs.

The Bacon Curers' Association of Ireland, which comprises the leading firms in the trade at Cork, Limerick and Waterford, are now distributing all over Munster well-bred Yorkshire boars that are calculated to greatly improve the breed of pigs raised by farmers in the southern province. These boars have been obtained at considerable expense from the best herds in England for the purpose of infusing, in due time, new blood into Irish-bred swine, so that the progeny will be most likely to suit the requirements of the bacon trade as far as the raw material is concerned. In connection with the maintenance and proper development of the Irish bacon industry a much better class of animal than those usually raised throughout Munster is urgently needed, hence the object in view in importing the best bred boars that could be obtained from England and their distribution amongst the farmers of the south.

A number of inspectors have been appointed by the Bacon Curers' Association, whose business it is to travel through the Province of Munster, placing the boars at centres where most required, and at the same time to diffuse the most reliable information to farmers and others interested in the matter as to the best method of raising pigs suitable for the Irish bacon trade of the future.

The boars have been located with farmers whose holdings are centrally and conveniently situated, to facilitate and encourage the farmers of each district to avail themselves of the opportunities offered them in this way of improving the class of pigs bred in the southern counties.



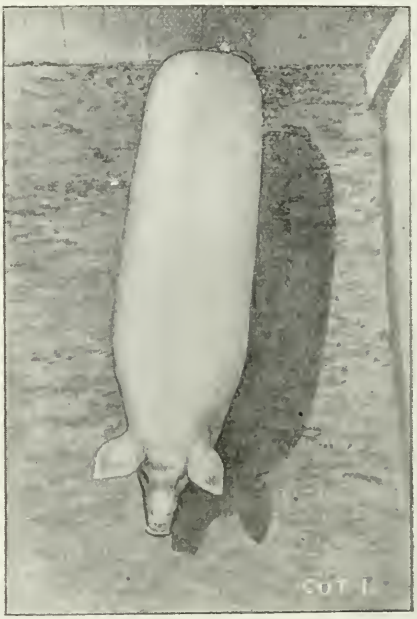
Cut L.—A carcass of prime quality; fat evenly distributed all down the back.

Cut M.—Cured side. What is required for th British market. Side of bacon of first-class quality. Note the even distribution of lean.

As a rule, the farmers are only too glad to avail themselves of the boon which the thoughtfulness of the Bacon Curers' Association has provided for them in this respect. These boars are distributed practically free in each district for breeding purposes, but the animals are held by way of loan from the Association, who still retain the boars as the property of the bacon curers concerned in the scheme.—*The Wm. Davies Co., Limited.*

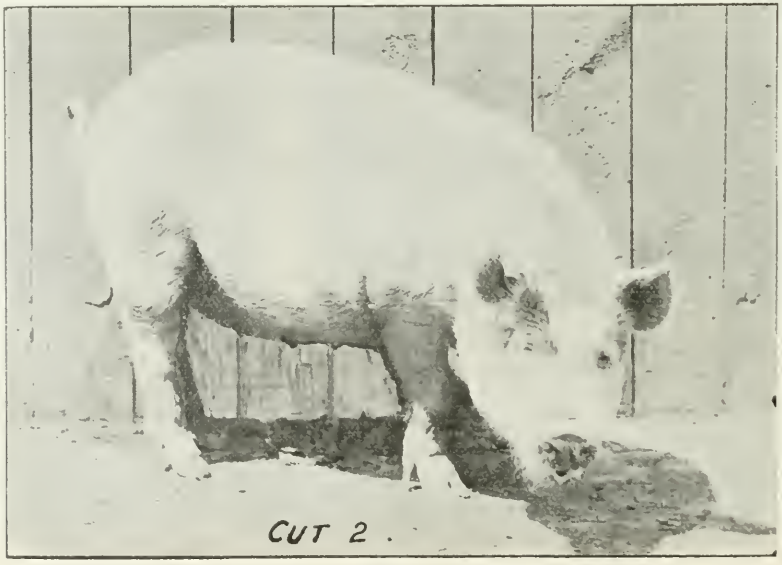
SUGGESTIONS BY ANOTHER PACKING FIRM.

The hog is an important animal, and has figured as one of the important products of Canada from the beginning, but only in a very uncertain way until a period easily covered by the last twenty years, while the period of real growth hardly goes back beyond ten years. "Has he come to stay?" is a question often asked by sensible farmers, and until they obtain an answer which shall satisfy them they will hardly spend the money necessary to equip themselves for the business of raising and marketing hogs. Canadian hogs will, no doubt, continue to be used in supplying the Canadian market, but it is the export branch of the trade which promises the best results, and we hesitate not to say that it is by no means transient in its nature. A slice of choice ham or bacon nicely broiled is too good a thing for our relatives in England to give up eating; they want it now, and will continue to want it so long that we may hope never to see the end of the demand. We think, therefore, that our farmers need have no fear whatever that the hog industry will "play out." Whether the average Englishman knows a good thing when he sees it is not quite clear, but when he can taste it also, then all doubts vanish. Let it be understood, then, at the outset, that the export trade demands a good article, and cannot be trifled with with impunity, and this, possibly, is one of the hardest things for the farmer to understand and believe. To attain the highest results the farmer must do his part well, then the packer must use all diligence from first to last; he must see to it that first-class transportation is obtained both by land and sea; then when the meat arrives at its destination it must be properly and promptly handled. There are a good many links in the chain, and if only one be defective the desired end is not attained, the result being disappointment and loss instead of encouragement and profit.



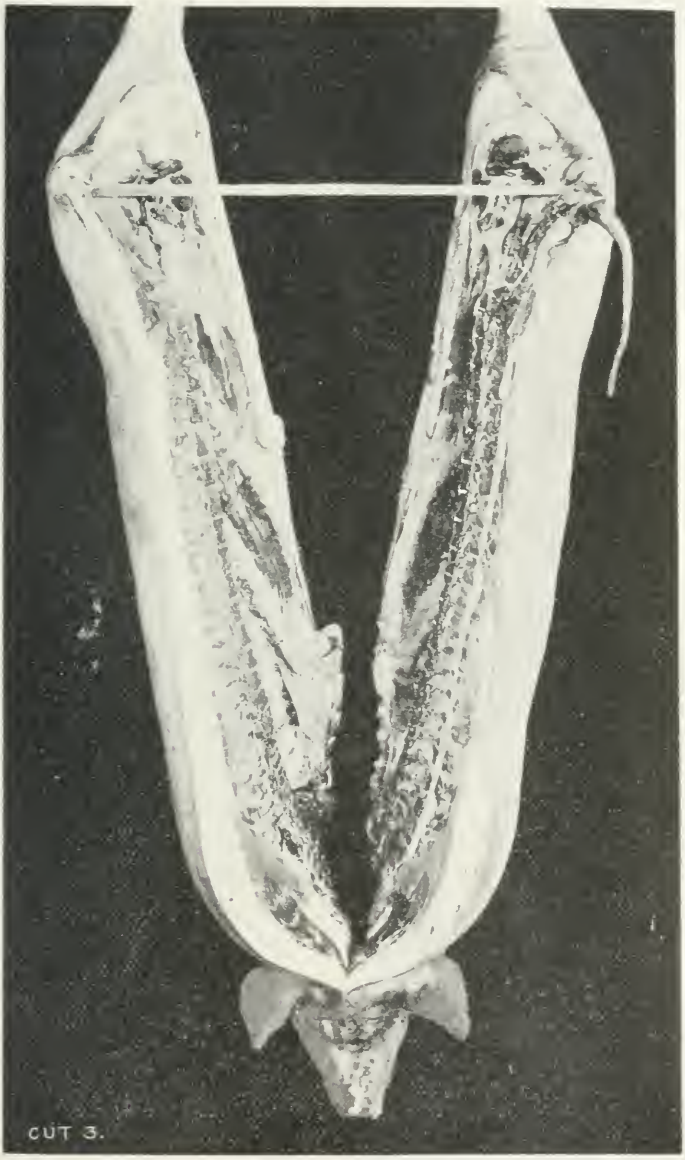
CUT 1.—Lean Singer. This view, taken from above, shows a good, even back.

Being packers, we write as such, but consider it wise to take the farmer into our confidence as far as possible. Neither one can get along without the other, and the more the farmer knows about the business the better he will be able to cater for it.



CUT 2.—Lean Singer. Another view of the animal shown in Cut 1.

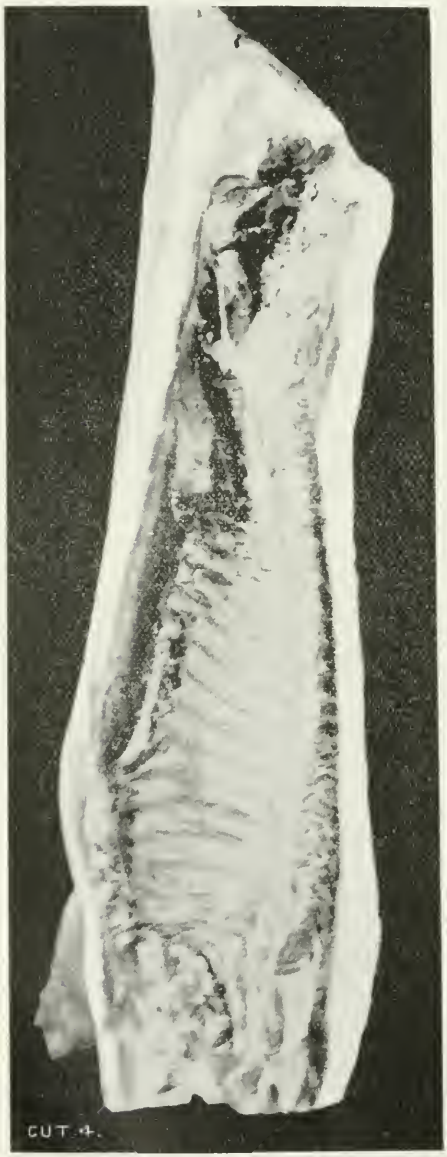
and we welcome them at all times to our packing house and gladly show them the different kinds of hogs being received, and point out what is good and what is bad, hoping by such means to interest and educate at the same time. It has been said that "eternal vigilance is the price of freedom"; we go further and say it is the price of nearly everything that is worth having.



CUT 3.—Lean Singer. This view of the dressed hog shows that, with the exception of a slight thickness on the shoulder, the carcass is otherwise entitled to rank as A1.

We must not think for a moment that we have a snap in supplying the British market with bacon and hams. Others are fully alive to the value of such trade, and, while Canada may be given a preference, let us not bank too much on that; they are after the best goods for the least money, and mere sentiment of itself will not count very much in the long run.

It seems to be rather beyond our province to tell farmers how to breed pigs ; still, it might be in order to say that the young pigs cannot be too well cared for. If the weather be wet and cold they should be kept in a dry and warm house. Exposure to wet and cold is most fatal to young pigs. We strongly recommend the spaying of all females not intended for breeding purposes. The advantages resulting from this operation will be obvious to every practical farmer on a moment's reflection. When a sow has proved herself a good mother it is best to continue using her as such just as long as results are satisfactory, even if the period should extend to twelve years or over ; there is little sense in marketing so many old sows ; the best of them are only despised, and their age does not cut much figure. When they must be sold they should be well fatted ; they then make fair mess pork. When boars are old and no longer required for use it would be far better to kill and bury them in a dung heap than to pursue the course usually followed ; they are mostly low in flesh, and require a lot of good food before they are sold, and during this time they are a nuisance to the farmer ; then, they are a curse to the drover, and a blister to the packer. Nobody wants their meat at any price, and they often do more damage in a car of good hogs than they are worth. Keep them on the farm, and put the food they would eat where it will do more good. This advice may sound strange to some ears, but we know it is right, and hope it may be put into practice.

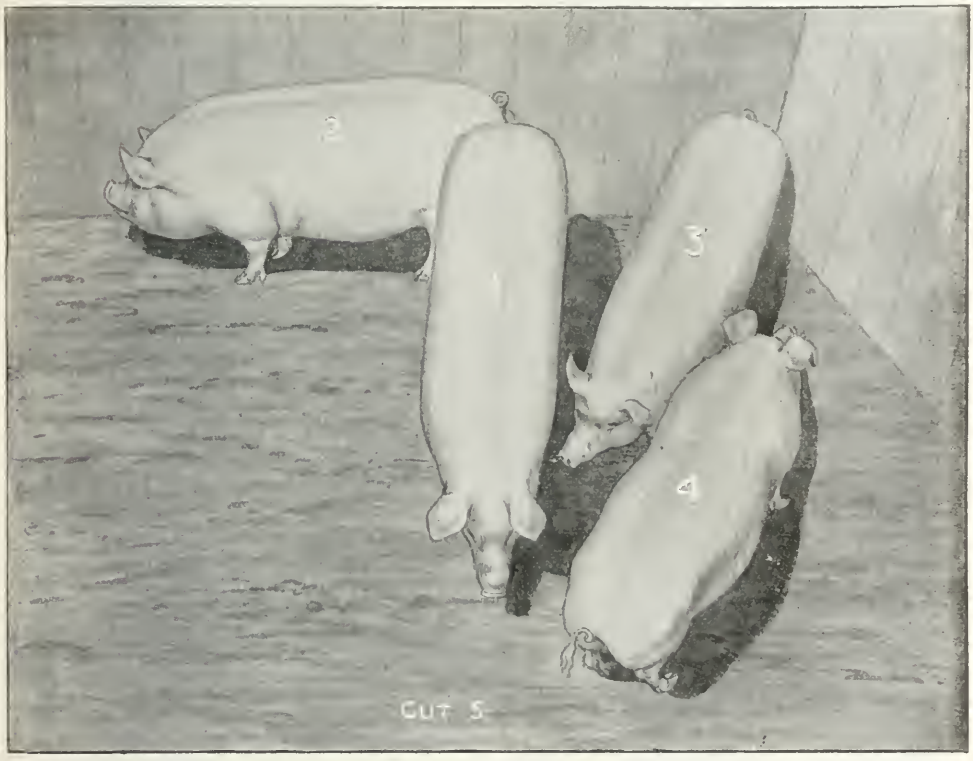


Cut 4.—Lean Singer, side view, cured side. The evenness of the fat on the back, with the slight increase on the crown, is well shown in this cut.

Cut 6.—A type not wanted by the packers. Fat in every particular.

Marketing Pigs.—Now, a word about taking the pig to market. There are people who take far too much thought for the morrow in this matter, and try to get enough food into them to last for some days. Such a practice has nothing to commend it, further than to show up the character of the man. Not unfrequently it

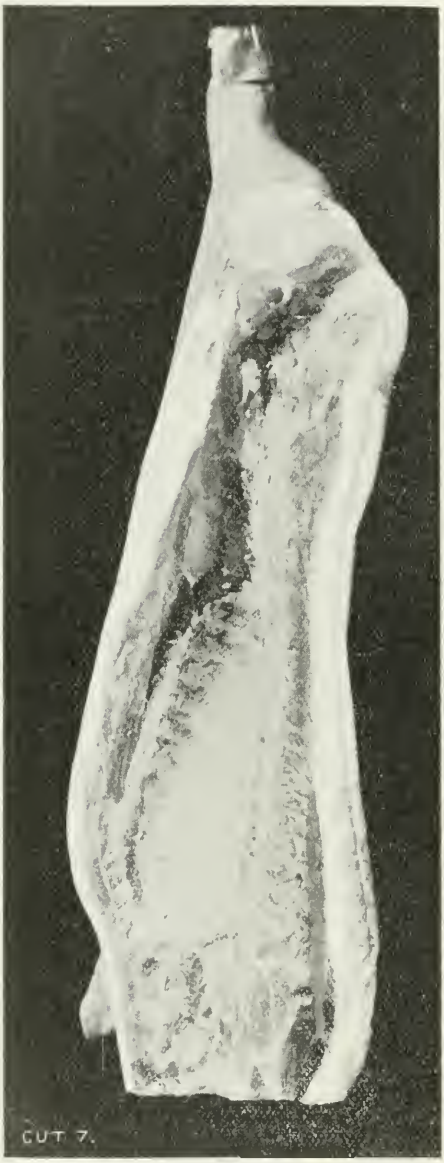
means a dead hog when the destination is reached, and if not that it certainly means an inflamed condition of all animals so treated. It is a damage to the trade, and will be stopped by some means before a good condition of things is reached. Let us be reasonable on this as on all other points. On the day for delivering the pigs let them be fed dry grains, and only



CUT 5.—Of this quartette Nos. 1 and 3 are good, while No. 2 is fat and No. 4 is bad.

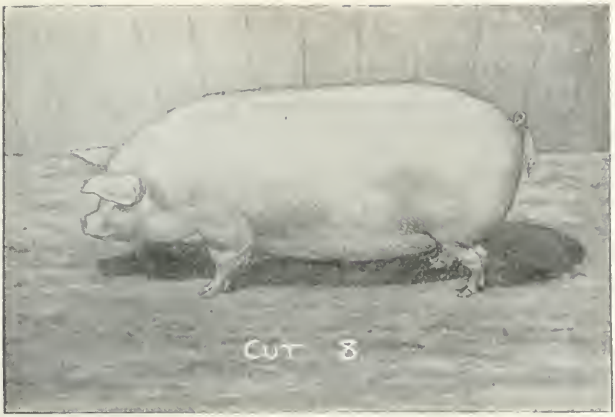
moderately. They will thus stand the journey much better. Build a chute, or inclined run-way from pens to wagons. Avoid as far as possible all excitement in loading. Let the sides of wagons be opened (a rack made of boards one inch by six inches is good) so as to allow them plenty of air. Cover the wagon with brush, straw or other material to protect them from the hot sun. If boards are used let them be high enough not to scrape the pigs' backs, and so make a blemish for all time to come. In hot weather carry a pail and wet them down as opportunity offers. When unloading, never use a wagon rod to punch them out. The best plan is to get right into the wagon, and, if necessary, use your feet in pushing then out. In all cases care should be used in handling to avoid bruises and broken bones. Much damage is caused in this way, and the farmer very properly has to stand his share of it. When the pigs are handed over to the drover or packer, the farmer's part of it is about done, but he is still interested in ultimate results, as they will certainly come back to him in the shape of increased or decreased prices for future lots.

When it is best to sell pigs. We would say, sell them when they are ready, that is, when they are in good flesh and weighing around 175 pounds. Sometimes the demand will call for them somewhat heavier, and now and then a little lighter, but a good bacon hog of 175 pounds usually tops the market. Remember the demand for bacon runs all through the fifty-two weeks of the year, and it will often pay to have them ready between times. October, November and December are not remarkable months for high prices. We give the above only as a hint. Every feeder must decide this matter for himself. We desire to serve you by doing what in us lies. Produce a steady supply and thus maintain as steady a price as possible. *We see nothing but injury for the trade in sudden and violent changes in the price.*

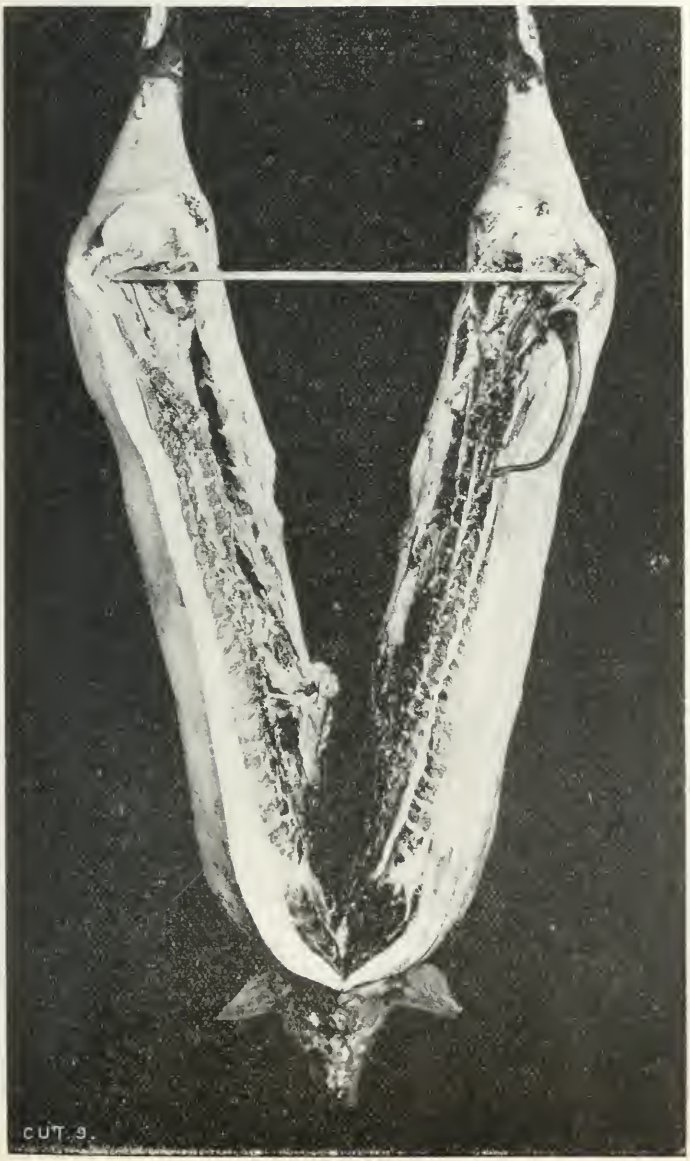


CUT 7.—Cured side of the pig shown in Cut 6 not wanted even for the home trade. Too fat and short.

What kind of pigs do the packers want? Long and lean, they say. The writer has walked up and down the pens at the Fair in Toronto, looking for this kind, and they were nearly as scarce as hens' teeth. To be sure the Tamworths and improved Yorks were there, and others that might produce the right article, but the conclusion forced itself upon one that a lot of good money was being given as prizes for heaps of fat, worthy only of a day long since gone by, and the recent hot spell may have done service by killing off several of the kind alluded to. Let us now and forever stop the giving of prizes for breeds of animals that are not wanted to any extent. There are enough back numbers in the farming community to raise plenty of heavy fats without being subsidized, and by all means let them do it, and let us encourage only those breeds that are known to possess merit as bacon hogs. But, in again turning to the question "What kind of hogs do the packers want?" we doubt if any answer can be given that will ensure satisfactory results in every case, for in the same litter we find a marked variation, especially in length. Now, the right plan is to make the best of things as we find them, and when we find that we have several pigs that are short and with a disposition to put on fat, it would be well to see to it that they be fed lighter if possible than the longer ones, and market them when they weigh from 140 to 160 pounds. It is not essential that every pig should be a "singer," but this is confidential, as we do not seek to encourage the marketing of small pigs. Generally the markets are quite overdone with them, but we do think that the above is the best disposition that can be made of the short, light-boned pigs. The packer calls for the long, lean pigs, as they are the ones that suit best and are most difficult to procure ; this is the only kind that will furnish the desired "Wiltshire side," and it will also make any of the other cuts the market calls for. A good type of pig is shown in the cuts 1, 2, 3 and 4. This lean singer has the back even in width, and the sides of good depth and even, and when dressed it shows up a good side, the belly is thick and fleshy, the fat over the shoulder is a trifle thick, but on the whole the side will go into the first class in any market. The fat is white and firm, and it will be quite evident that the animal was honestly fed, and by that we mean, fed with a view to making good meat. This kind of pig is not produced in five months by any means, and, while it is quite true that different feeders will get different results, we believe it to be a great mistake to crowd the young pigs too much, as it is sure to produce an excess of fat. It requires time to produce lean, and eight or nine months is a fair age for pigs that will top the market.



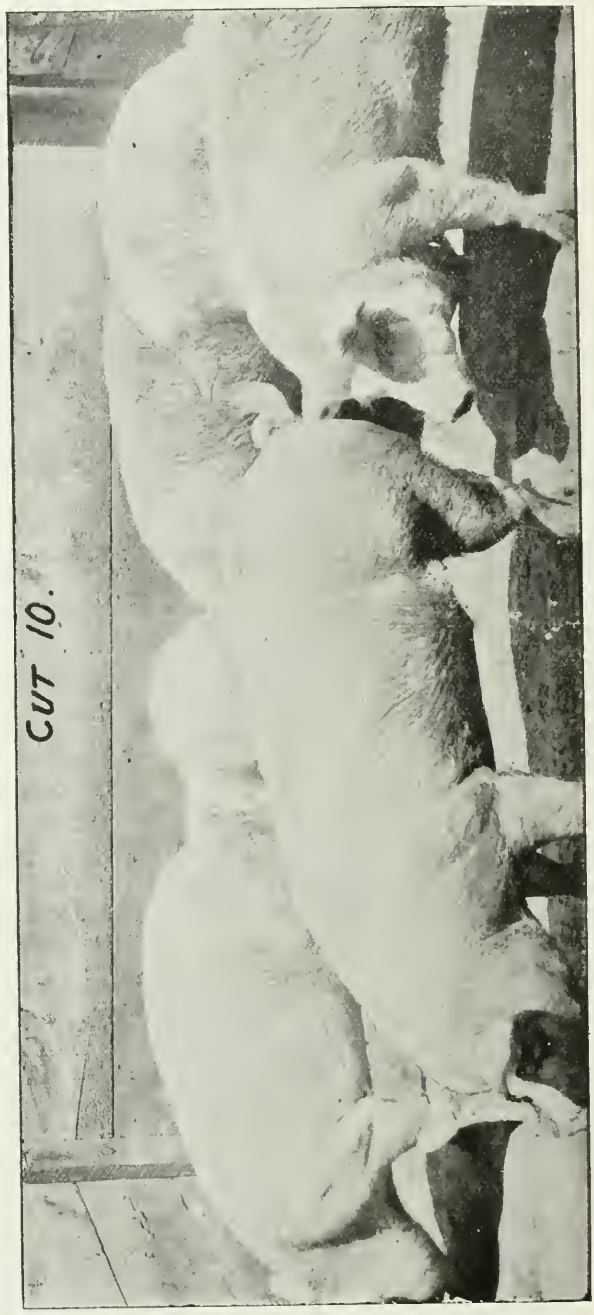
CUT 8.—One of the class of "stouts." Owing to the shadow its real depth is not sufficiently shown in the cut.



CUT 9.—Carcass of a Stout."—(Too fat.)

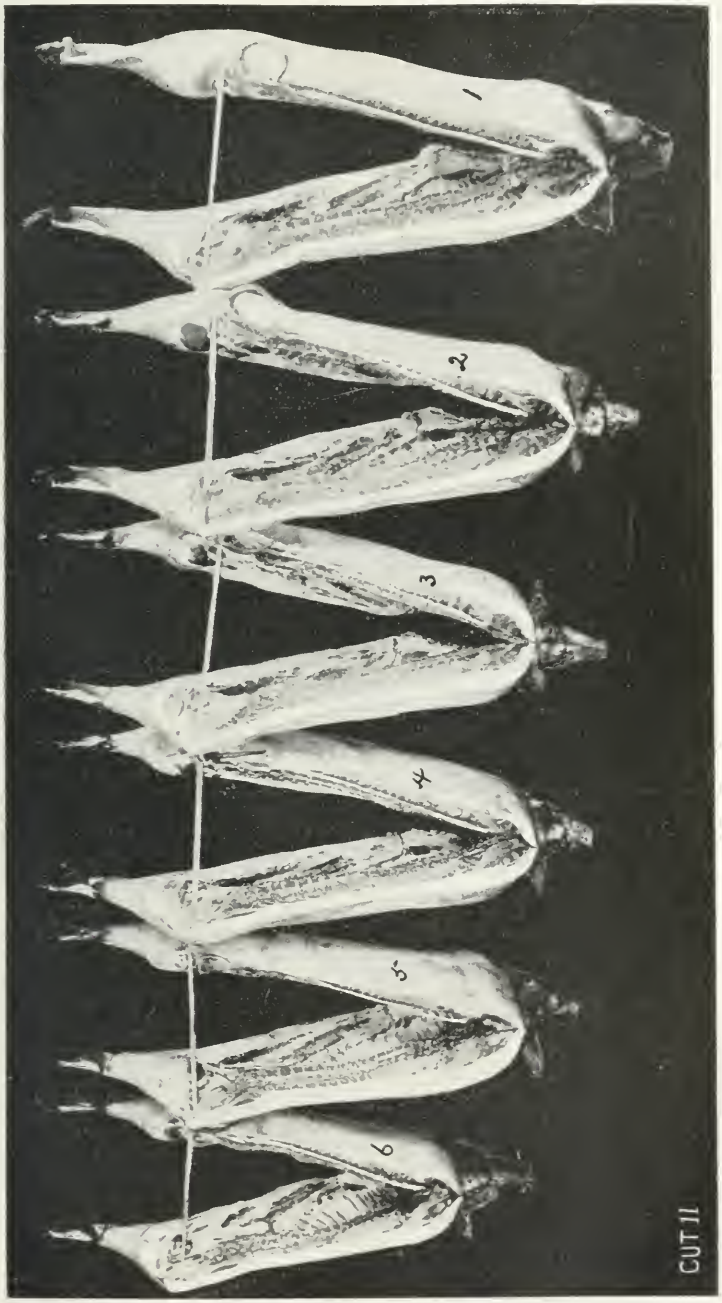
This pig was fed too long, and, in consequence, fetched 1½ cents per lb. less than lean singers of first quality.

Next, we have a quartette ; two of these are fine singers, Nos. 1 and 3, while No. 2 is fat and No. 4 we call bad, which means that it is good only for the cheapest domestic cuts, The export trade will have none of it—every part of it being too fat ; even the spare ribs are too fat. The head (see cut 6) denotes the Poland China breed, which is in ill odor with Canadian packers, but its character comes out the best after it is killed (see cut No. 7). There is then no room for argument. Such a side, if put into a box with others of better style for export, would condemn the others. There is another party known, doubtless, to some of you that will very rarely buy such meat ; we refer to the Canadian farmer himself. Time and again we have heard him call for leaner meats, as his folks could not eat so much fat. It is a little inconsistent to be sure, but it is a case of "murder will out," and lends force to our advice to sell pigs when they are ready. Even the lard market does not want so many fat hogs, for that article has sometimes to be sold at less than the live weight price of the hog. The protest against fat is well nigh universal, and further it is reasonable, for those not engaged in hard physical labor cannot eat much fat without suffering in consequence. Someone may suggest that there may be a change to the old order of things, so many and unlooked-for changes are being experienced ; but, in our opinion, such a chance is too remote for consideration. The next illustration (No. 8) shows a style of pig very commonly seen. Its pedigree is unknown to us. Its ears are rather long and legs short for a typical singer. Photographing hogs does not always produce desirable results. It is so very hard to get them in a good position, but when the next stage is reached (cut 9) it is different. Dead hogs are always good, and permit any kind of a picture to be made without objection. This shows up here very well in a general way, but, owing to its being fed about two weeks too long, it has to go into the class known as "stouts," which cuts down its price $\frac{1}{2}$ to $1\frac{1}{2}$ cents per pound, and such figures are sufficient comment ; we need not aim to feed stouts.



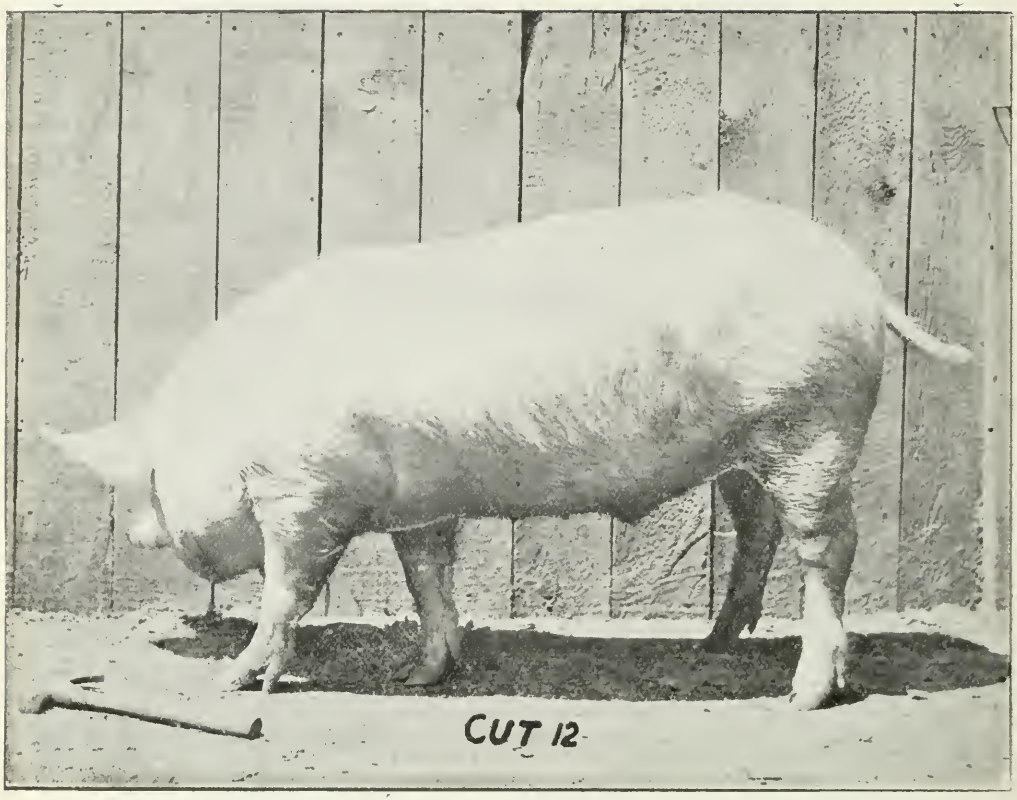
Cut 10.—A group of six singers.

The group of six singers, three of which are seen clearly in cut 10, the other three being rather indistinct, show up some nice meat, as the carcasses shown in illustration 11 prove.



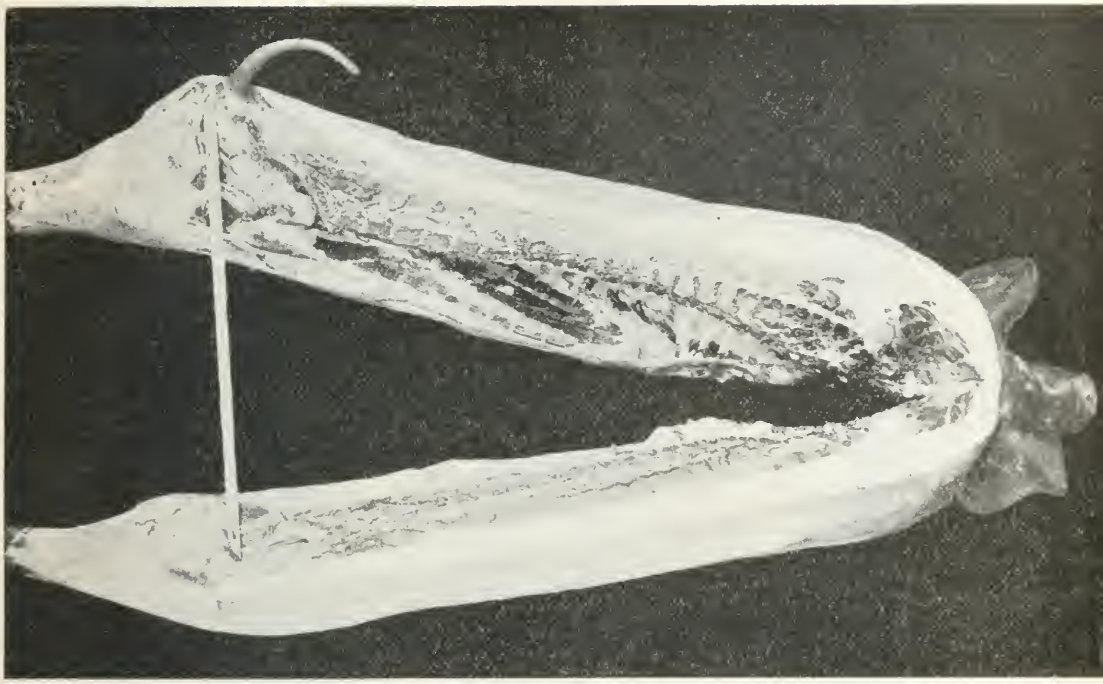
Cut 11.—Carcasses of the lean singers shown in Cut 10.

Nos. 1, 2 and 4 are especially fine, and all are good in quality; but, except Nos. 1 and 2, are too short, 6 being especially so. Why are long hogs wanted? They are more profitable, for, no matter how long, there is only one head to lose money; the shoulder is not much in demand, and does not seem to be materially increased with the increase in length. It is the middles and hams that are wanted, and, perhaps, the middle cut brings the most money all the time, and herein lies the reason for the demand for long pigs.

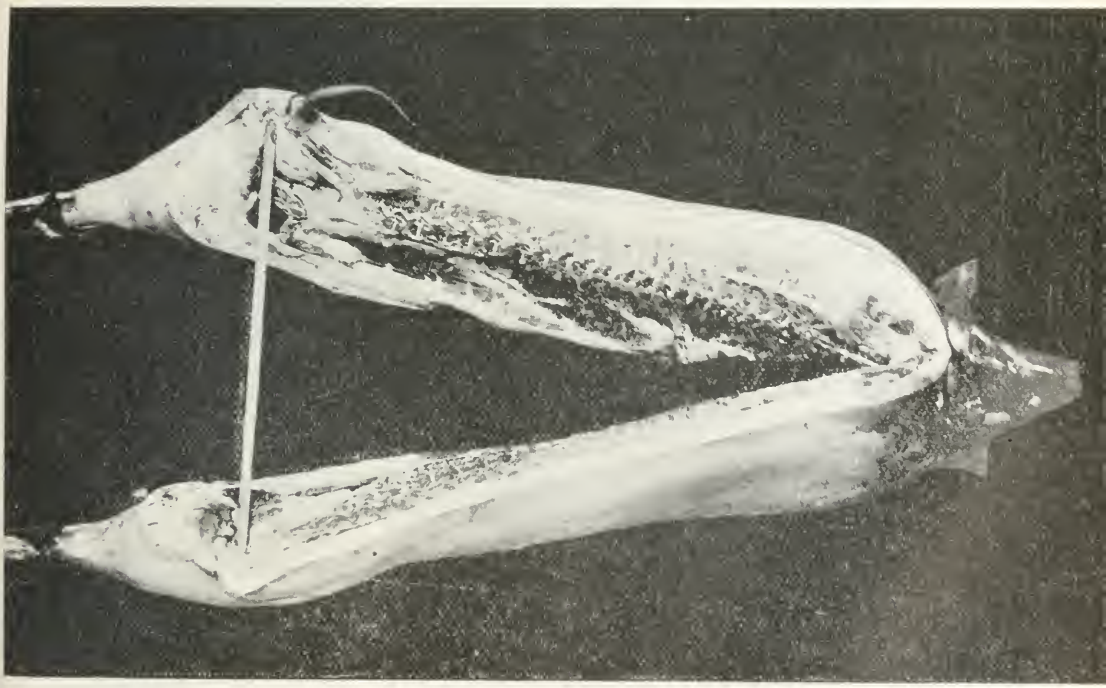


Cut 12.—Lean singer whose carcass is numbered 5 in Cut 11.

Cut 14.—Short stout. Not desirable.

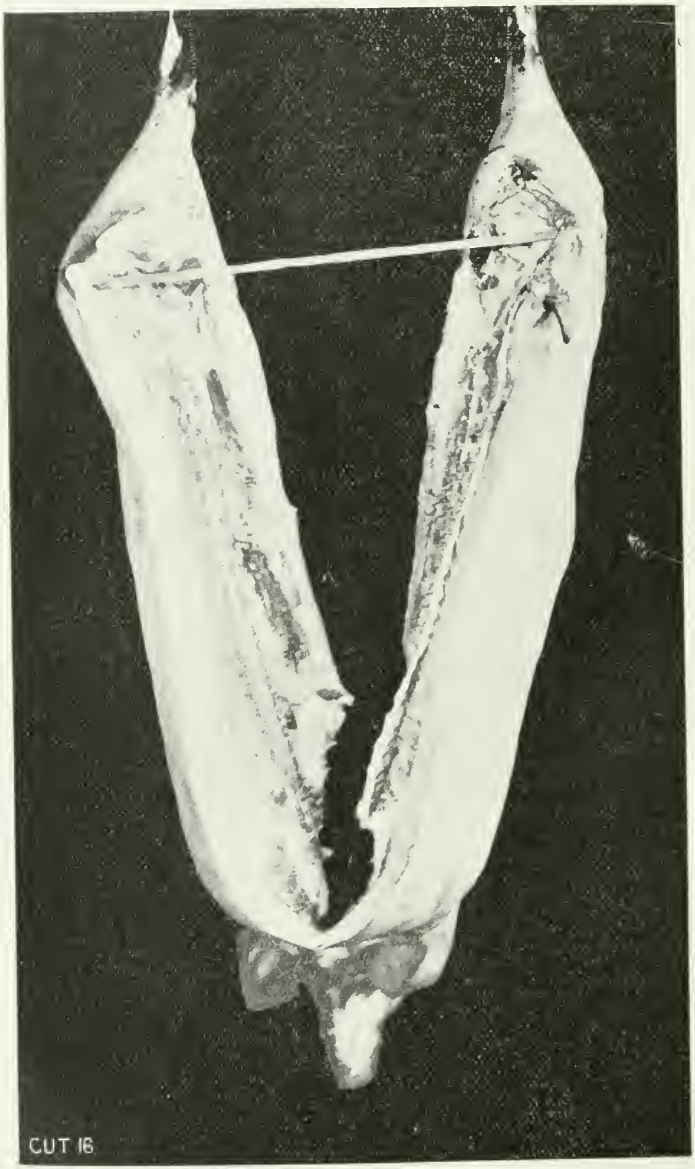


CUT 13.—Closer view of singer No. 5, dressed. Good in quality but too short to make the best price.



CUT 15.—Short stout. Carcass of pig shown in Cut 14.

Soft and Light Hogs. There are still two classes of pigs that are constantly being marketed that cause much annoyance and loss to the trade, and are a damage to the reputation of Canadian bacon generally, viz., soft hogs and light skinny ones of 70 to 140 pounds each. In our opinion, soft hogs are the result of soft feed in nearly every case, and are produced by those who are lacking in common honesty. They are trying to get something for nothing,



Cut 16.—Too fat and too short.

and when they feed cooked roots and other soft mushy food only, and say they think it makes first quality of meat, they disclose their ignorance, or rather, they do know that by such means the weight of their hogs is easily and cheaply increased, and that is as far as they are concerned. Grass feeding is also a cause of soft pork, and, in addition to being soft, the fat turns to a greenish yellow. Grass is well enough in its way, but pigs should be kept off it at least a month before being sold to the packers. Soft pork is produced just because it costs less than the right

kind, and if the trade is thus ruined those who are guilty will try and look surprised. Why so many light hogs are forced upon the market has always been a mystery: lack of food or lack of money on the part of the feeder will account for some of them but not all. The meat of immature pigs is not satisfactory, being soft, flabby and of poor flavor. It is bad policy to market any animals before they are in a fit condition.

As to the feeding of corn—this is a very important matter. We do not claim that the soft, trashy stuff that is marketed is fed wholly on corn, but we wish to call attention to the farmers who persist in feeding corn alone that they should not expect to get more for their hogs than American corn-fed hogs are worth, as corn-fed hogs will not make the firm and lean meat that mixed grains will do, and, on account of running too much to fat, will not suit the fancy export or domestic trade.

The Ontario Government is deserving of great praise for the efforts they are making to give the people all the information possible on this and other subjects, but the farmers will require to help themselves to the utmost if the greatest possible success is to be attained. While we write with an eye on the export trade chiefly, it might be in order to state this fact: the Canadian consumer is taking very kindly to the meat of the best export hogs, and this feature will grow more pronounced as the days go by. The time-honored Long Clear, while still in demand, is not holding the position it once did, and the people will come to fight shy of the winter-cured meat from dressed hogs, as their education in this direction proceeds. The future demand will be almost entirely for live hogs of 160 to 200 pounds with a sprinkling running up to 250. *Ingersoll Packing Company.*

WESTPHALIAN HAMS.

Westphalian hams have a justly earned reputation in the Old Country, which is attributed, first, to the breed of pigs kept in Westphalia, which produce very tender meat and a minimum of fat; second, to the way in which these pigs are fed; and, third, to the way in which the curing and smoking of the hams is carried out.

The hams which bear this name come mostly from Hamburg and are cut in a peculiar manner. The legs of pork used average about fourteen to sixteen pounds in weight and are cut long and narrow, running up to a peak. The breed of pigs from which they come are called "Ravensberger Kreutzung," or "The Ravensberg Crossbreed." They are large in size, with slender bodies, flat groins, straight snouts and large heads, while a noticeable feature is their very big overhanging ears. Their skin is white and covered with straight little bristles.

At one time the Westphalian pigs were fed largely on the acorns which they picked up in the oak woods, but this method of feeding is now superseded by the more modern one of feeding in pens. Potatoes enter largely into the ration given. These are well cooked, and then, skin and all, mashed in the potato water. The pulp thus obtained is thoroughly mixed with wheat, bran, or with rye, barley or oatmeal in a dry, raw condition. Corn is not used. Where practicable sour skim-milk is largely fed, and raw cut green cabbage is also considered beneficial. The food is given in a semi-liquid state, just moist enough to flow thickly into the trough. Plenty of fresh drinking water is allowed, and pieces of soft coal are given from time to time in order to promote digestion. During the hot season the pigs are, in many places, thoroughly washed every week with soap, water and a hard brush, and given plenty of exercise.

Curing the Hams. The hams are first of all rubbed well with saltpetre and afterwards with salt. In order to ensure thorough salting, as many cuts as can be made without spoiling the hams are made near the bone and strewn with saltpetre and salt. The hams are then pressed in a pickle tub and entirely covered with cold salt lye in which they remain according to their size, from three to five weeks. After this the hams are taken out and hung up in a shady but dry and airy place in order to become "air-dry," a process which requires some weeks to be thoroughly done. If the outside of the ham is not absolutely dry, but is moist or sticky, it must not be put into the smoke house. Smoking is done in specially prepared large rooms, the hams being hung up on the ceiling. The smoking is done with sawdust and wood shavings, to which are added juniper, beech and alder boughs and chips. The smoking must be carried on slowly. Some smoke the hams for a few days, then expose them for a time in the fresh air, repeating this process until the hams have become brown enough. They should be actually in the smoke for two or three weeks. After smoking, the hams are kept in a shady, dry, cool and airy room.

Loudon M. Douglas in his "Manual of the Pork Trade," gives the following alternative method of curing these hams: "Rub them well with the following mixture: Saltpetre, 1 pound; sal prunella 1 pound; Egyptian sugar, 1 pound; Bay salt, 1 pound; bruised juniper berries, 2 pounds; bay leaves, ½ pound. Turn them frequently for three days, then rest them for a week,

after which make a brine with the above ingredients, with the addition of one gallon each of water and vinegar. Baste them for a fortnight with this and then take them up and wipe dry. Hang up in a current of air, and smoke for two or three weeks with oak sawdust and juniper chips. They must be placed at the very top of the smoke house, so that the smoke will come in contact with them only when it is cool. Bracken or fern may be added, as well as juniper chips or branches, to the oak sawdust."

PORTABLE HOG HOUSES.

Where swine are kept in an orchard or in fields at some distance from their ordinary quarters, temporary sleeping accommodation, which will also act as a shelter during stormy or wet weather, becomes very desirable. There are several forms of portable houses. Of these one of the best is the one described below, which is in use at the Iowa Agricultural College, Ames, Iowa. The illustration gives a good idea of its appearance. Prof. Curtiss gives the following method of construction :

The house is 8 feet square. There are four posts on each side 2 feet 8 inches in length. The sleepers, five in number, which are 2x4 scantling, are made runner shape and are 8 feet long. Four plates are required which are also 8 feet long. Three sets of rafters are used which are cut in 5 feet lengths. The ridge board is 8 feet 8 inches long. The flooring is made out of four 12x16 inch boards cut in the centre. The sides and ends are covered in with 8 inch drop siding with grooved inch roof boards 10x12 cut into two pieces without waste for the roof. The window in the end is 24x21 inches, that in the roof 2x5 feet. The door is made 2 feet 6 inches by 2 feet 8 inches. Where not otherwise specified the lumber is 2x4 inches.

PORTABLE HOG PEN.

Another pen which is very extensively used in Wisconsin is thus described by Mr. Geo. McKerrow, Superintendent of Farmers' Institutes : " My favorite size for a portable pen is 8x8 feet. I first make a plank platform 8x8 feet on oak sills, nailing a 2x4 bevelled scantling on each side on the end of the planks to which the lower ends of the roof are nailed. The roof is composed of boards 16 feet long and 12 inches wide cut in half, making each side of the roof 8 feet. Thus the pen measures 8 feet in every direction except the perpendicular, which is a fraction less than 7 feet in height. The door in front should be large enough to admit the biggest hog kept in the range, and windows and ventilators can be made to suit. The pen can be moved on a stoneboat wherever it may be required. It will accommodate from one to ten pigs according to their size. If this pen is used in wintertime it would have to be banked up a little at the bottom.

A Canadian Portable Pen.

Prof. Day, of the Ontario Agricultural College, Guelph, sends in a plan of a pig pen somewhat similar to the Wisconsin one. He writes :

The pen may be modified in many ways to suit the requirements of the person using it. For summer use it may be set on a high and dry piece of land and used without a floor, or old boards may be laid on the ground and the pen set on top of them. If required for cold weather the pen may be double boarded with matched lumber with building paper between. When a

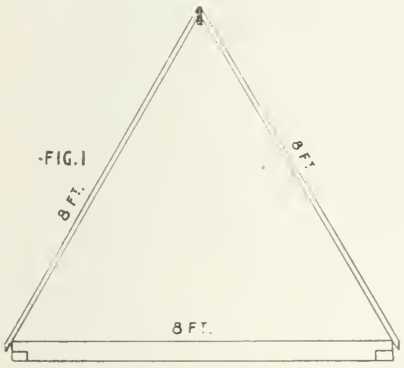


Fig. 1.—Showing sills made of 4x4 inch scantling, and slope of roof. Two 4x4 inch scantling, 16 feet long, make the sills.

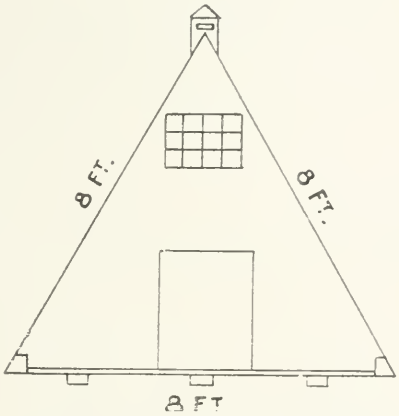


Fig. 1a.—Front view of portable hog pen, where three scantlings are used as sills.

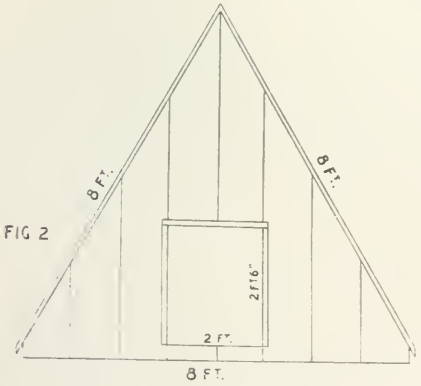


Fig. 2.—Front view of No. 1.

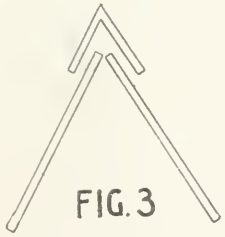


Fig. 3.—Showing a method of arranging ridge boards to afford ventilation when pen is intended to have doors closed.

single thickness of ordinary lumber is used, it will be necessary to batten the cracks. The amount of lumber required for a pen will vary, therefore, with the style of pen. The pen is 8 feet square, and as shown in Figs. 1 and 2, boards 8 feet long are used for the roof, therefore, 16-foot lumber cuts to advantage. For summer use no door will be necessary, and an opening near the peak on the opposite side to the front opening will permit a free circulation of air. If required for cool weather, and a door is used for the opening, a window will be necessary. A door large enough for a man to enter may be made on the opposite side from the small door, if desired.

PRODUCING EXPORT BACON.

By Prof. G. E. Day, Ontario Agricultural College, Guelph.

So much has been said and written of late regarding the bacon hog, that it requires some courage to again approach the subject. In spite of all that has been written, however, there still seems to be considerable haziness in the minds of many regarding what constiutes a bacon hog, and regarding the nature of our export trade in bacon.

In the first place, it must be borne in mind that the ideal hog of the American packer is very different from that of the Canadian packer This fact has been the cause of much confusion, and yet the explanation of this difference in the requirements of American and Canadian packers is very simple. It arises from the fact that, generally speaking, American packers supply a market which is quite different in its requirements from that supplied by the Canadian packer. In the English market, therefore, Canadian bacon of the best quality does not come into direct competition with the bulk of American bacon, but has to try conclusions with the bacon of Ireland and Denmark. Different sections of England call for sides of different weights, and the most desirable side in one section may be entirely unsaleable in another.

Canada's export staple in swine products is what is known as Wiltshire bacon, and London is the home of this trade. The market is limited and extremely fastidious. The light sides, which may be very desirable on some markets, cannot be sold in London at any price. It therefore taxes the skill of the Canadian packer and feeder to retain the foothold already won in this market, and our only hope is to keep other competitors out by the superior quality of our products. That we have done fairly well in the past goes without saying ; but it does not follow that we need not make any further efforts in the future, for other eyes are being directed towards our market, and we must fight for our lives if we are to obtain and retain supremacy. Some astute American writers have attributed the higher prices paid for Canadian bacon in England, to the "pig-headed" prejudice of John Bull. It would be well for us if such were the case, but we have only to examine the prices of American and Canadian beef in England to have our dream of sentimental considerations rudely dispelled, and to teach us that however much John Bull may love us, he will not do violence to his stomach to oblige us.

Type of Hog Required. For the production of best Wiltshire bacon, a particular weight and type of hog is required. The best weights are probably from 170 lb. to 190 lb. live weight, though these are not cast iron limits The hog should be light in head, jowl, neck, and shoulder. He should have medium width of back, great length and depth of side, good thickness through from side to side of belly, well developed ham, and medium bone. He should be active and sprightly, and possess general smoothness of body, showing no coarseness in any part. When cut down the back the fat should be of uniform thickness over loin and shoulder, and firm in texture, while the belly should be thick. The carcass should show a good development of lean meat with a fair amount of fat. While many hogs are made too fat, it is also true that many are sent to market before they are fat enough. Of course it is impossible to have all hogs measure up to the standard described ; but there is always a greater or less demand for lighter and for fatter bacon ; and if a general effort were made to produce hogs suitable for Wiltshire bacon, there would still be enough light or fat hogs to supply the demand for the other classes of goods, without glutting the market, as is often the case at present.

It must also be remembered that in order to successfully hold a trade in any product, there must be not only uniformity of quality, but some degree of uniformity in quantity as well. If at any time we fail to furnish our share of Wiltshire bacon, we are giving some other country an opportunity to step into the gap. In this country we have the climate, we have the foods, we have the hogs, and we have the brains, so that if we wish, we can hold the English trade against all comers. It remains, therefore, for the Canadian feeder to choose whether he will make an effort to control the best English trade, or whether he will become a competitor of the American feeder. A glance at the market reports of the two countries should enable him to quickly make up his mind.

Popular Errors about Bacon Hogs. Let us briefly notice some of the objections commonly raised against the bacon hog. One objection is that the packer wants the hog before it is heavy enough to satisfy the feeder. This objection is scarcely logical, for it has been very clearly demonstrated at various times that the cost of producing a pound of gain steadily increases as the hog grows heavier This fact was also brought out in our experiments at the Agricultural College during the past summer. From frequent weighings of 36 hogs the following facts were brought out

While increasing in live weight from 54 lbs. to 82 lbs. hogs required 3.10 lbs. of meal per 1 lb. of gain.

While increasing in live weight from 82 lbs. to 115 lbs. hogs required 3.75 lbs. of meal per 1 lb. of gain.

While increasing in live weight from 115 lbs. to 148 lbs. hogs required 4.38 lbs. of meal for 1 lb. of gain.

While increasing in live weight from from 148 lbs. to 170 lbs. hogs require 4.55 lbs. of meal per 1 lb. of gain.

Other experimenters have carried the hogs to much greater weights, and the amount of meal required for a pound of gain is almost invariably found to increase as the hogs become heavier.

But the greatest and most common objection to the bacon hog is, that it costs more to produce it than it does to produce the fatter types. This claim has gone unchallenged for so long a time that it seems to be generally accepted as a just one, and yet, when we come to investigate, we are struck by the remarkable dearth of evidence in its support. In our latest experiments, the group which evinced the most desirable characteristics from a packer's standpoint, was first out of six in point of economy of gain. The group scored second by the packer, was fourth in economy of gain; while the group scored third by the packer, was second in economy of gain. No doubt it requires more careful selection and skilful feeding to produce the bacon hog, but it has never been proved that the bacon hog necessarily requires more food to produce a pound of gain than is required, on the average, by other types.

The bacon hog, like the poet, is born, not made. Food can modify, but it cannot overcome individuality; and the foundation of our bacon industry rests upon judicial selection and mating of breeding stock. There is not space to discuss this question here, but it may be said in passing that the principle just enunciated is recognized by breeders of all other classes of stock, and applies with equal force to the case under consideration.

Bacon Types found in most Breeds. We must be very careful to remember that because a hog belongs to a certain breed, it does not follow that it is necessarily a good or bad bacon hog. In our investigations we have found very good bacon hogs in practically all our leading breeds. In some cases, however, those which came nearest to the packers' standard were farthest from the standard of excellence for the breed. A standard of excellence which calls for a thick, arched neck, wide shoulder, and proportionately wide back, is as far from the packer's standard of excellence as it is possible to get. Hogs of this pattern are excellent animals for certain purposes, but, in themselves, they are entirely unsuitable for Wiltshire bacon.

But no breed is perfect. All have their weak, as well as their strong points. We must remember, too, that the great bulk of hogs sent to the factory is made up of grades and crosses, and not of pure bred hogs. This fact renders it possible to utilize probably all our larger breeds of swine. What is necessary, however, is that the breeder of market hogs should have a clear cut ideal in his mind as to what constitutes a bacon hog, and then he will be in a position to make the best use of the materials at his disposal, by intelligent selection and cross-breeding. What is the best cross is not known, and probably never will be known; but this much is certain: if a sow possesses undesirable qualities from a bacon standpoint, it is folly to mate her with a boar of a breed characterized by the same qualities, and hope to produce a bacon hog. Breeders of pure-bred swine will ultimately promote the interests of their chosen breed by giving conscientious advice to the rank and file who produce the market hog, even though they occasionally lose a sale by so doing. Prejudice must be laid aside, merit must be recognized wherever it exists, and then there will be an end to much of the aimless work that is only too common throughout the country.

Soft Bacon. But, after obtaining a good type of hog, it is still possible to produce poor bacon. One of the great difficulties which our packers encounter is the soft condition of the fat of many hogs. One of our leading packing houses states that during the months of May, June, and part of July, of the present year, the number of soft sides ranged from 20 to 40 per cent. of the whole. This means that Canada placed upon the market this year a large quantity of inferior bacon; and while this bacon was not misrepresented, but sold purely upon its merits, at the same time it was Canadian bacon and tended to bring discredit upon Canadian bacon as a whole. It surely requires no argument to convince anyone that this means an ultimate loss to the producer, because when our packers meet with losses of this kind, their only remedy is to pay lower prices. It therefore becomes a matter of vital importance, not only to the packer, but more especially to the feeder, that less soft bacon should be put upon the market; and the problem of how to produce firm bacon should be carefully studied by every man who has a pig to sell. Like the man in the fable, we may kill the goose that lays the golden eggs. In producing firm bacon, we are not studying the packers' interest, but are merely taking heed to our own.

Soft bacon does not mean fat bacon. It means a soft condition of the fat, which develops while the bacon is in the salt, and reduces the value of the side according to its degree. An absolutely soft side is comparatively worthless, and between this condition and firmness there are all shades and degrees of tenderness. Sometimes softness is noticeable before the bacon goes into the salt, but often apparsntly firm sides comes out of the salt decidedly tender or soft.

Various speculations have been indulged in regarding the cause of softness. It has been claimed that it is due to over-feeding and forcing hogs to heavy weights at an early age. Possibly this may be true where the forcing process has been carried to extremes, but in our experience we have found more softness among unthrifty hogs that were too lean when slaughtered, than among heavier and fatter hogs which have received the same food and treatment. It has been said that corn is responsible; but we have produced soft bacon without feeding a grain of corn, and by feeding wheat middlings at first, barley and shorts later, and peas, barley and shorts for six weeks at the close. We have been told that it is due to lack of exercise; yet we have produced perfectly firm bacon from hogs that have had the least possible exercise from time of weaning to slaughtering. It has been freely stated that it is due to feeding hogs on clover; yet reports are to hand of hogs that were sent from a clover pasture to the factory and pronounced first class. From this apparent mass of contradictions, one thing appears fairly clear: softness is not due to any one cause, but may result from various causes, acting either singly or in conjunction.

As yet, investigations regarding the causes which may produce soft bacon are merely in the initial stage. On some points we have a little light, on others we have none; but it is sometimes a useful employment to probe our own ignorance, and it is certainly a good thing to make the best possible use of the knowledge we possess. Then let us briefly look into some of the investigations up to date.

Danish Experiments as to the Effect of Different Foods. The most extensive and reliable experiments on record regarding the influence of food on the firmness of bacon are those conducted at Copenhagen, in Denmark. Without going into details, it may be said that extensive experiments of the Copenhagen Station go to show that the continued feeding of corn to young hogs tends to produce softer bacon than when barley was fed alone, and that the softness varied, more or less, according to the proportion of corn in the ration, or the length of time during which corn was fed. Such evidence from such a source looks to be fairly conclusive against corn feeding in the case of young animals, but whether the evil influence of corn can be overcome by certain methods of feeding remains to be investigated. The Danish investigators also found that wheat bran and rye shorts produced similar bad effects, so that corn was not the only undesirable food according to their results.

Experiments at Guelph. It has been already intimated that experiments are in progress at our Agricultural College, in connection with the influences which affect the firmness of bacon, a brief account of which will be given. Previous to this year's work, it had been noted that those hogs which had been fed in pens from the time they were about two months old were more seriously found fault with for tenderness of fat, than similar hogs fed in outside lots where they had plenty of exercise. It was also noticed that hogs which had been allowed abundance of exercise until they reached about 100 pounds live weight, and were then put in small pens and fattened rapidly, were pronounced firm. These examinations, however, were made before the bacon was put into the salt, and are therefore not altogether reliable. During this year hogs were fed in several different ways, and the bacon was examined after it came out of the salt, so that there could be no mistake about its firmness. A short description of the experiments follows

Thirty-six pure-bred hogs were purchased when from seven to nine weeks old. They were divided into three groups, each group containing two hogs of each of six different breeds. One group was fed in pens with small outside yards. From July 4th to August 19th the ration was wheat middlings; from August 19th to September 12th, it was equal parts by weight of barley and shorts; and from September 12th to October 24th, it was equal parts by weight of peas, barley, and shorts. When the carcasses came out of the salt the condition was very unsatisfactory. Only four out of the twelve were positively firm, one was only slightly tender, and the remaining seven ranged from decidedly tender to soft.

The Value of Whey and Skim-Milk. Another group was kept in the same building in exactly similar pens and fed exactly the same meal ration, but about two pounds of whey were fed with each pound of meal. When these carasses came out of the salt, only one showed any sign of tenderness, and the remaining eleven were first class as regards firmness. Such a striking difference cannot be accounted for on any other basis than that the whey was responsible for the superiority of the second group.

The remaing group were allowed the run of a half-acre lot, and fed exactly the same ration as the first group described. This group came out of the salt in decidedly better condition than the first group, but not equal to the group which received whey.

By far the greater amount of tenderness was found among the lighter and leaner hogs, and since several unthrifty hogs had been purposely put into the third group, the group was placed at a disadvantage. The hogs in the third group, which were heavy and fat enough for Wiltshire bacon, were all firm but one.

In addition to the pure-bred hogs, twelve grade hogs were purchased. They were strong, fleshy stores, fresh from the stubble fields, and averaged about 109 lbs. live weight. They were put on full feed in pens for six weeks before slaughtering. Part were fed corn meal alone, part were fed a two-thirds ration of corn meal with all the rape they would eat, and part were fed equal parts by weight of peas, barley, and shorts. All these hogs produced firm bacon except one in the peas, barley, and shorts group, which was somewhat tender. There seems to be little danger, therefore, of spoiling hogs of this class with either corn or rape.

Twelve more grades were confined in pens from time of weaning to slaughtering. They were fed skim-milk and wheat middlings (except during about three weeks, when they were fed skim-milk with barley and shorts) until they reached an average live weight of about 100 lbs. The skim-milk was then discontinued, and during the next six weeks, some of them were fed corn meal, others were fed equal parts by weight of peas, barley, and shorts, and the remainder were fed a two-thirds ration of the peas, barley, and shorts mixture, together with all the rape they would eat. All of these hogs produced firm bacon, excepting one in the group receiving peas, barley, and shorts with rape. Now, practically the only difference between the feeding and treatment of these hogs until they reached 100 lb., and the group of pure breds which gave such very bad results, consisted in feeding the grades skim-milk with their meal ration. It would therefore appear that skim-milk has a very beneficial influence on the firmness of bacon.

Conclusions. Gathering together the different points, we may draw the following general conclusions, so far as the work has gone :

1. Though, according to Danish experiments, corn tends to produce softness of bacon when fed to animals in the early stages of growth, it apparently produces no evil results when used in finishing hogs that have had plenty of exercise until they reached about 100 lbs., live weight.

2. Neither does corn appear to have had any bad effects when used for finishing hogs that have had no exercise, but have been fed skim-milk with a mixed grain ration until they reached 100 lbs. live weight.

3. What has been said of corn may also apply to rape, when two-thirds grain ration is fed with it.

4. Soft bacon can be produced without feeding corn or clover.

5. Hogs confined in pens and fed on wheat middlings during their early growth, and peas, barley and shorts for the finishing period, have a marked tendency to be soft.

6. Hogs given plenty of exercise and fed as just described produce firmer bacon than those confined in pens.

7. The evil effects arising from lack of exercise can be overcome by the judicious use of whey or skim-milk. The amount of whey recommended is from two to two and one-half pounds of whey to each pound of meal.

8. Whey and skim-milk appear to have a greater influence than exercise in producing firm bacon.

9. Unthrifty hogs are more likely to produce soft bacon than growthy well-fed hogs.

When we reflect that Denmark, which produces such high-grade bacon, is essentially a dairying country, our results with skim-milk and whey assume increased interest.

As stated before, these investigations are merely in their initial stage, and the results obtained are being followed up by a study of the influence of corn and other foods upon the very young animal. It is to be hoped that feeders of swine will awake to the importance of this matter ; and the object of this paper is not so much to impart information regarding the results obtained as to stimulate interest in one of our great agricultural industries.

Let us not forget that the success of the swine-breeding industry is inseparably connected with the quality of the swine products which we place upon the market. We are at the mercy of a despotic ruler, known as the "consumer," and for his favour we must humbly sue.

PROF. ROBERTSON'S ADDRESS.

THE BACON TRADE—FEEDING CHICKENS FOR THE ENGLISH MARKET—CANADIAN FRUIT IN ENGLAND.

MR. CHAIRMAN AND GENTLEMEN,—I am glad to come to this joint meeting of the Dominion Swine Breeders' Association and the speakers at Farmers' Institutes of the Province of Ontario. I do not know any body of men who are doing work that bears more directly on the prosperity of the people than those who speak at Farmers' Institutes. I recognize these Institutes as being one of the best agencies that benefit the people of Ontario in their material interests. I am a graduate of the Farmers' Institutes. Years ago I learned much more from each Institute I attended than any man in the audience could get from what I said. I have followed that practice from that time to this.

I have been asked to say a word or two to Farmers' Institute speakers as such before I speak of my subject proper. It is always of great advantage to a speaker if he has a few sound principles for his guidance before he begins. These I have laid down for myself for many years and have found them beneficial in my experience. The first principle is that every statement should be correct; it should, as far as possible, be quite clear. If it takes a man an hour to get his mind clear on a subject, he had better spend that hour alone than waste five minutes of each of a hundred men with incorrect, or misty, indefinite statements. Every statement should be, as far as possible, concise, and the speaker should treat the subject as completely as can be done in a twenty minutes' talk. The spirit of the man has very much to do with the impression he makes, and, therefore, with the effect of his speech on the audience. The three telling things are sincerity, sympathy and earnestness. It may help a young speaker who has not had much experience to have these principles stated for him. It will be of advantage to the audience and benefit to the speaker if he can treat his subject in not more than three divisions, and make each stand out separate from the others. Not many men can carry away from a meeting more than three distinct lines of thought about a subject. Under each heading should follow the thoughts related to it in their proper order. So, in speaking to-night on the Fattening of Swine for Market, I will try to follow my own principles.

Before I present my three main divisions I should like to enquire, Can the business of rearing and fattening swine be carried on with any profit? Such a question is asked of every man who stands before an audience trying to lead in any economic matter,—will it pay? That depends on the man, and not on the business. If a man asks me if swine rearing or fattening will pay, I reply that it does not depend on the trade or the market; it depends on the man. It must be paying on the average or people would quit. If a man is capable he can make any business that is a going business in his country pay; and if he has no definite capacity for that particular business he cannot make it pay.

Then some one is sure to ask, What breed will it pay best to get? That depends on the management and market; and I think a recognition of these two things will enable a capable man to make any one breed pay as well as any other breed in Canada. There are certain characteristics that are common to all the breeds; there are some slight differences between all the breeds. What are these special differences? Are they important and are they permanent? That leads me to say that all the domestic animals we possess have been improved out of wild forms. How was that effected? What makes the difference between the great races of humanity? If you go back to the fundamental causes, they are climate, the way they get their living, and the kind of food they eat. Whether they hunt, or fish, or live on cereals, or fruits, or roots, the kind of food they eat affects their bodies. That applies to all races of animals—it applies to pigs. The differences arise from shelter; that is the first consideration in the keeping of pigs for profit. After that comes the treatment, and then the food. That is from the owner's standpoint—the shelter, treatment and food. Looking at it from the pig's standpoint, it is a question of comfort, habits and nourishment. From the man's standpoint, let him give the pig treatment that will form in him correct habits—habits of behavior. Even a pig is susceptible enough to reflect a good many of the qualities of its owner. If you find a man who is precise and orderly in his methods, whose pigs are always fed at a certain hour, and bedded at a certain time, and cleaned at a certain time, those pigs will also have peculiar punctuality of behaviour; but if everything goes in a haphazard way, the pig will have that same unhappy-go-lucky want of a curl on his tail. The kind of food and nourishment affects his behaviour and his temper; a man's food afects him in the same way. These are the three heads under which the principles should be considered, and I will try to present some which you may apply.

Shelter. Consider the hog, how he grows; and he grows in a bare skin from his babyhood. Never an animal lives with a bare skin that does not need clothing or shelter. You

have the cow, the horse, and the dog with hair; the sheep with wool; they require much less shelter than the pig. But the farmer has thought that the pig with no natural shelter, did not require any artificial shelter. The pig left shelterless will go back as quickly as possible to the wild hog condition; and let his owner feed him for the sake of having a pig around the place. Even in a mild climate where pigs go wild they run in the sheltered forests and are not exposed to the wind. How much less should a bred up pig, that has lost its bristles and had its skin made thin, be exposed to winds. In my judgment the greatest drawback to profit making is leaving pigs exposed to cold winds—want of sufficient efficient shelter in cold weather. Cold winds across a pig's back will give him constipation in a very short time even with laxative food. Shelter for pigs costs very little, and warm quarters will let them thrive.

Then they should have a warm and dry sleeping place—reasonably dry, and reasonably warm. A pig will stand as intense cold as any domestic animal if the air be still, but if there is a draught across him, good-bye to all profit. The floor of the pig house should be made of wood or of cement covered with earth. He should never lie in cold weather on cement, bricks or stone. But if it is cement, covered with six inches of earth you have a capital floor; for if his education has been attended to when he was quite young you can have the pig trained to keep it dry and clean. Then the pig should have some bedding; it pays. There is no better way of using straw than to absorb the liquid voidings of the pigs and preserve it for application to the fields. The floor should be built with a slant as the cheapest and most effective way to provide a dry sleeping place. It is better to have the slant towards the trough; then the water runs under the trough to the gutter and the whole part behind remains dry.

For the walls, if built of stone, they should be hollow for our cold climate to keep the inside from becoming intensely cold, for stone is a first-class conductor of cold and heat. Wooden walls, with two thicknesses of paper between, will often be found the cheapest and best. There is something not well understood that in stone-walled pig houses there is apt to be more rheumatism than in other buildings. If they are exposed to draughts you will have pigs stiff in their joints and having all kinds of ailments, I think largely owing to constipation. It is a good thing to have the house well lighted and ventilated. What ou want is a house that warm, dry, free from draughts and well ventilated.

Treatment or Management. The next point is the treatment of the pig from the man's standpoint, and the habits formed from that treatment. The pig is undoubtedly filthy enough in his tastes but always cleanly in his habits if he gets a fair chance and a little encouragement when young. The pig kept in a pen should be clean skinned from his own management of himself. Let me say a few words about the sow and her brood. It is not a good plan to select the prettiest looking pig when it is a suckling. Beauty of form when the animal is quite young is apt to be deceiving. They say that every pretty boy baby grows to be an ugly old man. After the pigs have been weaned for six weeks take the pig that has shown the most thrift between weaning time and that period, and you will be sure to have the best pig for breeding purposes. If it thrives then it will give a good account of itself later. It is not a good plan to breed from very immature stock; it is not profitable for immediate results, and it is very risky as regards the thriftiness of the pigs and the getting of large litters in the third generation. The feeding of the sow when in pig is better understood by breeders than by the general farmer. If a man breeds pure bred pigs he knows the value of preserving the whole litter, but the ordinary farmer does not understand about the nourishment of the sow in a common sense and satisfactory way when she is carrying pigs. The common opinion is starve the sow and keep her lean—if she is fat you will have trouble. If a sow is starved the pigs are not well nourished; she should be liberally fed when carrying her young. She should be made to take enough exercise and be fed on such food as will keep her from being constipated. Freedom from constipation is the main point in successful pig-raising.

Sows should be fed on bulky food; it distends the stomach and gives the pig a better shape. It is a capital plan to let sows carrying their young sleep on an earthen floor. There is no place fit for a sow to lie on then except earth, with a little bedding over it. That is my observation, although I cannot give any philosophical reason for it. In winter provision should be made to let the sow swallow in a good deal of soil, and every breeder who has tried putting up a stack of sods in the fall and feeding them to his sows in winter, will keep up the practice. It will often prevent that ravenous feeling which makes a sow want to eat her young, and it is better than medicine. Do not forget to see that the sow is regular and loose in her bowels for a few days before she farrows. It is a capital thing to let the sow know the man who is to look after her during that time, so that she is not frightened by a stranger. She should be fed sparingly for four or five days after she has farrowed. If she does not give much milk for the first four or five days and the pigs squeal, they are not suffering as far as profit-making goes. If the pigs are allowed to be hungry the first few days, they are more healthy afterwards, and the sow will do better than if fed on rich sloppy food.

In weaning, the pigs should not be taken off all at once, but should be tempted to eat a good deal before they are separated from their mother. That prevents stunting and does not give as much trouble. The pigs should be gradually weaned after being left on the sow for six weeks or two months. At the end of that time they will be eating enough food to nourish their bodies, and the separation will not be felt. It is needful to have a pig pasture or some skim-milk or butter milk to carry them over the weaning period. A gallon to every three pigs is a liberal allowance per day. At one time I conducted an experiment with six litters of well bred and well born pigs. After they were weaned—not till nearly two months old—I picked out six representative lots. Then I had one lot of culls. These six chosen lots of well born and well bred pigs were put up for a feeding test on grain only and they grew well and gave satisfactory returns. They gained a pound live weight for every 3.82 pounds of grain consumed, or less than four pounds of grain per pound of increase during the whole feeding period. Now the runts, the culls, from the same litters were put in a pen by themselves and just left to grow up. Half their food was skim-milk, a quarter was waste from the tables of the farm houses, and a quarter grain. In two months' time they were the best lot of pigs of the seven lots—longer, lustier, healthier, thriftier. You would have thought them better bred pigs. That was the most striking evidence I ever had of the value of a mixed diet made up largely of skim-milk for the first two months after the pigs are weaned. It gives you the frame, and growth of bone and muscle, the depth and length. I think that one of the causes of soft hogs, and of the hog troubles we have, is that the young pigs sometimes do not get a good chance for the two months after they are weaned.

Food. Now, about the feeding of the pig. The food should be sufficiently nutritious to supply all the material the growing pig needs. I have had the bones of pigs grown on a diet containing some skim-milk put in a testing machine, and then I had the bones of pigs of the same litter fed on grain only, tested, and it took 81 pounds greater pressure to break the bones of the pigs fed on skim-milk than the bones of the pigs fed on grain along. The skim-milk furnished something that the grain did not, which the pig needed. It is hardly practicable to raise young pigs with profit unless there be a supply of skim-milk or buttermilk. Next to skim-milk in value is clover pasture for young pigs to furnish the flesh-forming materials. In some of the western countries the pork packers say that clover is bad for pigs. By going to western Ontario this autumn I found out how they feed their pigs. They raise their young pigs on corn in pens after they are weaned and then turn the grown shoats on a clover pasture to fatten before they are sold. That would not make a very excellent kind of bacon. But if the practice were reversed and the pigs when growing bone and muscle and vital organs were put on clover until upwards of a hundred pounds in weight, and then put on corn or a grain ration composed half of corn, you could get a very good quality of bacon with the least possible cost to the grower. The foods given to pigs should never be in a decayed condition. It should be served regularly and offered in such a way that the pigs will eat it up clean three times a day. There is a lot of loss by feeding pigs more than they can digest. An over-fed pig lies down instead of taking exercise. It does not pay to feed a pig so much that there is something left over in his trough after he is fed.

The flesh-forming parts in food should be in correct proportion to that part of the food that goes to produce heat and make fat—that is called the nutritive ratio. In the case of pigs, the nutritive ratio is found to be best at about 1 to $4\frac{1}{2}$ or 1 to 5. Bran is 1 to 5; shorts, 1 to $5\frac{1}{2}$; shorts and water make a very fair feed. Corn is 1 to 9—it has too much of the fat producing, heat-producing qualities to the amount of flesh-forming qualities, and the lean parts of the pig will not be sufficiently nourished by it. Skim-milk has a nutritive ratio of 1 to 2, so that with Indian corn and skim-milk you have a very fair combination—similar to beef-steak and potatoes, bread and butter, etc. Reasonable combinations of food like that, with the narrow and wide rations put together in a meal, enable the farmer to use corn with safety and profit, but to feed it with whey is wasteful folly, because they are both wide in nutritive ratio. The whey contains chiefly sugar and fat and both foods are largely wasted. Whey is the thing with peas which are of too narrow a ratio. Foods having a wide nutritive ratio should be mixed with those having a narrow one. In my report of 1897 you will find a statement of the nutritive ratios of most foods of the farm, and if you can make two of these balance so as to give 1 to $4\frac{3}{4}$ or 1 to 5, you will have a fair food for pigs in most cases.

It pay to have the food for milking sows fed cooked and warm, but with other pigs it does not seem to make any difference. Pigs will grow faster on steamed food than on raw, but they consume about equal quantities per pound of increase. As to the whole or ground food, pigs consume about ten per cent. more of the whole grain, therefore it pays to have it ground. There is no difference in the cost, but there is a slight difference in favor of the ground grain in the general growth and hea hiness of the pigs. As to feeding soaked or dry, I find that pigs give a little better gain from dry grain, but the quality is not quite as good, and there is a certain amount of risk as to health. On the whole I am in favor of ground grain, fed soaked.

Mr. Hodson : You said there is no material difference in the cost of production whether the feed was boiled or fed in a soaked or dry state.

Prof. Robertson : As between feed soaked, raw or steamed, there is no material difference.

Mr. Hodson : Then a man would loose his work and fuel in boiling ?

Prof. Robertson : Yes, but the hogs will grow rather faster on the cooked food. I do not think that in the fattening of hogs it pays to steam the grain.

Prof. Day : That is regarding grain alone ?

Prof. Robertson : Yes, but that does not apply to milking sows. I want to say a little about skim-milk, buttermilk and whey, because enquiries often come as to the quantities to feed profitably. I think the general conclusion is that it does not pay to fatten hogs on an excessive amount of milk. For every 100 pounds of milk about 30 pounds of grain should be fed. It very seldom pays to feed a pig being fattened more than 5 pounds or half a gallon of milk per day ; it is not the best use of the milk to give more than that.

Q. What quantity of whey would you allow ?

Prof. Robertson : I would allow the pig all it would take ; it is different from milk. I would feed from two to three pounds of grain a day with whey to each pig weighing about 100 pounds ; you will then get the most rapid increase for the feed consumed.

Q. You have not mentioned barley ?

Prof. Robertson : Then it has been an oversight. It is a capital feed if fed ground and soaked. I think that in some places it would pay the farmers to grow a small acreage of rye. Rye meal is a capital meal for fattening pigs and the crop gives a lot of straw also for bedding.

Q. I fed a couple for the show and fed part middlings and part rye chop, and they gained 118 pounds in 60 days.

Prof. Robertson : Very good indeed.

Q. What quality of pork will corn give ?

Prof. Robertson : Well, the pork packers here do not seem to know how the pigs they buy are fed, but they know what kind of bacon they want. In Ayrshire, in Scotland, they have the best quality of bacon—the kind our packers are trying to get alongside of. I have been talking to the best bacon curers there and the best bacon hogs they get are fed on skim-milk or whey, and a grain mixture at least one-half ground corn and the other may be barley or oats or middlings.

Q. In the experiment in which you tried grain alone against a ration of grain and skim-milk, what kinds of grains did you use ?

Prof. Robertson : Wheat, barley, peas and rye in equal quantities. I have found that 100 pounds of skim-milk or buttermilk can be made to produce five pounds of increase in live weight, and 100 pounds of whey will hardly give an increase of two pounds. That is about the relative value of these two foods.

Q. Would you give a pig all the buttermilk it would take ?

Prof. Robertson : No, I think it pays to give a less quantity and keep more pigs. The temptation of a skillful man is to make his pigs ready for market as young as he can get them off his hands, because pigs give greater increase for the feed they consume when they are quite young and comparatively light, and the temptation is to rush them to a fat condition when quite young —at 5½ and 6½ months old. There would be a better quality of bacon and just as much profit if the pigs were not rushed for the first three months after weaning and till they have reached 100 or 110 pounds. Then they should be kept hungry and fattened slowly. It pays better and yields better quality.

There are two complaints that packers make in regard to the condition of hogs. I mention them to make you think of the difference. One is, the hogs are sometimes much too fat, especially on the back ; and the other is that they are much too soft A hog may be too fat and too soft both, or he may be too fat and yet yield the best quality of bacon as to firmness. The soft hog is worth the least money because the bacon will not stand smoking in England while the fat hog may sometimes find a market here. The cause of softness is not well understood. The probable cause is in not keeping the hogs properly nourished from weaning time till they are five months old.

Q. What are we to understand when you say that the soft hog will not stand smoking ?

Prof. Robertson : The bacon curer in Canada does not want soft pork because it cannot go into his best grade. When the bacon is exported it is sold to men who smoke these sides and soft sides will drip in the smoke room.

Q. Are they smoked before they go over?

Prof. Robertson: No, but the packers can tell the soft condition here.

Q. You have examined them over there?

Prof. Robertson: Yes. We found that the best Canadian bacon was selling at 50, 54 and 56 shillings per hundred weight (112 pounds) and the soft sides which looked almost equally well were selling at that time at 34 and 38 shillings with difficulty.

It is a good plan to market some hogs every month so as to have the supply steady for the packers and the revenue steady for the man who grows them. It is not a profitable practice to have them for sale only in October and November when the price is usually lowest. Ship every month and you share the high prices with the low prices. The most profitable time for shipping is often in June, July and August, when the price is best. It will pay the farmer to sell alive rather than kill and dress. We weighed a number of hogs to ascertain this, and found the shrinkage from 2 to 4 per cent. in the fasting and then from 17 to 22 per cent. from the time they were killed to the time they were dressed and cooled.

Q. About feeding young pigs on clover, the packers speak very much against it. The question I should like to know is if young pigs, say after four or five week weaned, are run on rich clover pasture and fed milk, will that be sufficient to keep them growing thriftily and well, or will they require grain with it.

Prof. Robertson: It would be better to have a little grain and less milk, because the clover takes the place of the milk. There will be no bad effect if they are finished on grain and milk afterwards.

Q. Did you find any soft hogs among the bacon you examined to-day?

Prof. Robertson: Yes, two of them.

Q. Would you advocate the use of sods for the brood sow as better than salt and ashes; do you mean the pig does not require salt?

Prof. Robertson: Oh no, but sods regularly also.

Q. Have you ever fed charcoal to pigs?

Prof. Robertson: I have let them have access to salt and charcoal with good results; I think it keeps them in good thrifty condition in the winter time.

Q. What about roots?

Prof. Robertson: Raw roots in a very cold place do not seem to make the pig thrive well. I have had no experience with rape. For pig pasture I know nothing better than a mixture of vetches and peas; it makes a capital pasture.

Fattening of Chickens.

I have not said anything about our bacon trade in England. It is growing very fast. Ham and chickens are two things wanted in England. We may have a share of that very good trade if we will fatten the chickens, but otherwise they can not be sold there at high prices. I was in England again last summer and I found that the southern counties are being largely changed in their agriculture by the method of fattening chickens for the London market. Mr. Fisher on my return said that we should start two illustration stations and get some information on the fattening of chickens in Canada. We accordingly started two stations. The chickens were put up in coops 6½ feet long and sixteen inches square inside. They were made with slats all round lengthwise on the bottom, top and back and up and down in front. They stand on trestles three feet off the ground and there being no floor the droopings go through. Every crate is in three compartments, each holding from four to five chickens. The chickens are fed from a little trough in front, three times a day, at first on oats ground fine mixed with skim-milk. During the first two or three weeks they are fed from these troughs. They take the food themselves. After the first week they are fed only twice a day and fed all they will eat up clean. After three weeks of feeding the chickens seem to lose their appetite and they will not consume enough to make them grow. Then they are fed by what is called a cramming machine. Although it may seem to have a harsh name it is to the chickens a most agreeable process. It is not hard on the chickens which thrive well on the food, and the process is not difficult.

This is the result of our experiments so far. 133 chickens were put up in these crates. They weighed four pounds five ounces each. They gained during the fattening period of six weeks, two pounds and nine ounces each on an average, and they gained nearly all that in four weeks, as they were moulting after that time. During the two weeks they were moulting they gained only 30 pounds. They gained 57 pounds the first week, 74 pounds the second week and

127 pounds the third week. When the moulting began they stopped almost still for two weeks, but they gained 58 pounds the last week. The best plan is to feed them for three weeks at most and then ten days with the machine. The gain, even with the moulting period included, was one pound of increase for every 5 1-10 pounds of grain and 7½ pounds of skim-milk. This is equal to a cost of about six cents a pound for the increase. Every pound of live chicken put up is made worth more by this fattening process.

In addition to this I put up 100 chickens to fatten at my own place. I killed three representative lean ones when I got them home. I had them cooked and left to cool for two days, and I had just an average of 12⅔ ounces per bird of edible cold chicken. The others I fed for five weeks. I did not have a machine at all, and lost two weeks at least, because they did not gain much at the last. I then killed three representative fattened ones, and each of them on the average yielded as much edible cold chicken as the whole three lean ones. The lean chickens cost me twenty cents each—60 cents for the three—and I, as a consumer, got better value in one fattened chicken than I got in the three lean ones. I had more eating on it. I think our farmers might develop an enormous trade with England in shipping over there these fattened chickens. During the last ten days we put a small portion of melted tallow in the food.

Q. Do you give them any grit ?

Prof. Robertson : Not at all ; the grain is ground fine.

Q. What color of legs does the market demand ?

Prof. Robertson : They must be white or yellow.

Q. Any difference between cockerels and pullets ?

Prof. Robertson : No. The Dorking seems to be the favorite chicken for fattening in England Those I have here are Plymouth Rocks. They should be put up before they are three months old and sold before any moulting begins. If those speaking on poultry at Institutes this winter want to get specimen chickens to show at the meetings, I am authorized to say the Department at Ottawa will send them with pleasure with a specimen case such as is used for shipment.

Q. Kindly describe the cramming machine ?

Prof. Robertson.—It is a hopper holding about a pail and half, to the bottom of which is attached what is really a small pump with a plunger, which is worked with a foot attachment. To the pump is attached a rubber tube, the end of which is pushed into the crop of the chicken, the chicken being taken under the arm. One stroke of the foot will pump the food right into the crop. A man trained to the work will handle between three and four hundred chickens every hour and fill them just right with this machine. They do it twice a day, morning and night. It is only used during the last ten days of the fattening period, when a chicken will not consume enough to thrive in the ordinary way.

Q. Is there an all year round market ?

Prof. Robertson : Yes, all the year round, with the aid of cold storage. When I was there ordinary chickens were selling wholesale at three shillings and nine pence each. I do not say ours would bring the best price at first. I saw a few chickens sold in London at a retail shop at six shillings and sixpence each. They were specially fattened French chickens, weighing from 6½ to 8 pounds ; but there is an enormous demand for ordinary chickens, selling at from 60 cents to 70 cents each.

Export of Pears

I should like to say a little about the fruit trade with Great Britain. We are sending a considerable quantity of pears to England, where there is a tremendous and growing market for this fruit. We sent 2,200 cases from Grimsby this year in cold storage put up in small packages. They realized at Grimsby, after meeting all expenses of transportation, commission, etc. about 73 cents per case, each case holding 27 or 28 pounds of fruit. That was the average. The best pears, well selected and of fine size, were sold to net $1.00 per case and the poorer ones at 46 cents. It does not pay to send inferior ones because the freight and charges are the same anyway. One can say with safety that over large areas of Ontario, where they can grow excellent crops of pears, they might go into the business with confidence that they will find a safe, large and profitable market in Britain. The things to consider are first, soundness, then keeping qualities, then appearance (color, size, shape), and then flavor. They like a slightly red-cheeked pear. They like the Bartlett pear. I do not think there is much chance for any other tender fruit, except for early apples like the Duchess. For grapes, plums, peaches or tomatoes there is apparently no likelihoood of a trade being successfully worked up in the near future.

THE PROPER BEEF TYPE.

By Prof. C F. Curtiss, Ames, Iowa.

Delivered before the Members of the Dominion Live Stock Breeders Association, Brantford, Ont.

I wish to say at the outset that the impression that the success of mastering the great problems in the field of agriculture does not require special preparation and fitness, as well as careful study and a high order of ability, is altogether erroneous. The idea that successful farming does not require a trained mind and the highest degree of intelligence, judgment and reason never had any foundation in fact. Robert Bakewell said over a hundred years ago that it was easier to find a dozen men fit for cabinet positions than one good judge of live stock, and the conditions haven't changed very much even to the present day. Has it ever occurred to you that the ability to simply judge stock accurately and well is at least of a rarer kind, if not of a higher order, than that which interprets the laws of a nation. The men who are employed to pass judgment on the live stock that goes to the great markets of this and other countries, men who are required to know simply one thing and know it thoroughly, command a higher salary than men who preside at the bar of justice in the highest courts of the land. This may seem like a striking statement, but nevertheless its truth is fully attested by the records and salaries paid for these positions ; and if you were to hunt the country over, I will guarantee that you would find a hundred per cent. more men competent to serve as judges in the highest courts than are qualified to pass accurately on the real value and utility of live stock. The men who are employed to do this work at the great market centers are thoroughly trained experts ; they must be able to determine almost at a glance just how much and what kind of a product an animal will cut on the block, and the work will permit of no inaccuracy. Their judgment and the training of their mental faculties involves thousands and almost millions of dollars in a single day. Why should not a breeder and feeder have the same discriminating judgment ? In other words, why is not the work of breeding, feeding and selecting domestic animals more of an exact science ? Simply because of lack of training ; to put it in other words and more plainly, men fail to breed good animals primarily because they do not know what they are, because they have wrong conceptions and wrong ideals or standards of excellence. A celebrated artist when asked to name the first essential to success in his profession replied "to see right." So it is in this field, no one ever succeeds without first seeing right. A man can no more attain the highest excellence and skill in agriculture without a clear mental conception of his object than can an artist produce a great masterpiece without a right conception of what constitutes the highest art.

During the closing days of the recent Trans-Mississippi Exposition at Omaha, while the stock show was in progress, a very successful shepherd, a man who was a real artist and a master hand at his profession, showed a sheep from his father's flock in England that was very much admired by all who saw it ; a sheep that was a marvel of excellence in all qualities that go to make up a perfect sheep. "Where was that sheep bred ?" inquired an interested stockman. "Ah," replied the young man, "that sheep was bred in England before I was born," meaning by the reply that it had taken fifty years of constant, thoughtful, painstaking and intelligent work to bring that animal to its present state of perfection.

Good stock does not come by chance nor by haphazard methods. During the Trans-Mississippi Exposition at Omaha, to which I have referred, a students' live stock judging contest was held, open to all of the agricultural colleges of the United States. There were seventeen contestants, representing five colleges. Each student was examined thoroughly on two classes of hogs, two of cattle and two of sheep, and one of the examiners in that contest, a man who was himself a practical, experienced stockman, and one of the keenest and most intelligent judges of our country, said that the young men whom he had examined were capable of going into the best herds and flocks of the country and selecting the best animals and giving a sounder and more intelligent reason for sustaining their judgment than nine-tenths of the owners or proprietors of these herds and flocks. You may ask why this was the case, and why those boys were able to do such creditable work ? I reply that it was simply by reason of thorough study and intelligent methods of investigation, by a careful and critical faculty of observing live stock which comes from analyzing the merits of animals point by point and considering the reasons and their logical results. I will say further, that all three of the prizes, amounting to $250, won in this contest, were captured by students from the Iowa Agricultural College and it may interest you to know that two of them were boys who came to us from Canada. We give you people due credit in the matter, but of course we gave them the finishing touches.

A brief consideration of the qualities of practical excellence in beef cattle may well engage the attention of the breeder and feeder. A topic of this character is too often regarded as of interest only to the professional exhibitor or the lecture-room instructor and student. But every successful breeder must always be a student, for the first essential in successful breeding is a clear conception of what constitutes a good animal and of all the characteristics that go to make up real excellence in a herd. It is said that the late renowned Amos Cruickshank, the founder of the great Scotch tribe of Shorthorns, was often seen by the side of the leading sale rings of Great Britain intently studying every animal that came into the ring, and his minute knowledge of all the animals shown was the marvel of those who chanced to converse with him about them afterwards. While the methods of the justly celebrated Robert Bakewell, the first great improver of live stock, were largely secret, it is known that he was not only an exceedingly close student of living forms, but that his rooms were also full of models and parts of domestic animals that he had carefully dissected and preserved for future reference. In his work of selection and improvement he imparted to the Leicester sheep such a remarkable aptitude to take on flesh that this quality remains, even to the present day, a characteristic of the breed to to a greater degree than of any other long-wooled breeds of England.

Fig. 1. - Champion Angus heifer, Smithfield (England) Fat Stock Show.

This aptitude to take on flesh is of vital importance to the beef producer as well as the breeder of show-ring and sale stock. The show-ring type must necessarily keep close to and be largely governed by the practical demands imposed by the feed yard and the block, else the lessons of the show yard and sale ring are without value, if not positively misleading. No one is more concerned in what constitutes the essential qualities of a good beef animal than the man who breeds and feeds for the block and attempts to meet the conditions imposed by the market; for it must be kept in mind that this is the ultimate end of all beef stock, and the best beef animal is the one that carries to the block the highest excellence and the most profit. This, in a word, is the keynote of the whole problem.

The Beef Type.

There is at the outset a well defined beef type that admits of less flexibility than is generally supposed. We hear much about the dairy type—and there is a dairy type, fairly clean cut and well defined—but there is also a beef type, more clearly defined and less variable than the dairy type. Common observation and experience confirm this assertion. There are not a few cows of quite positive beef tendencies capable of making very creditable dairy records, and a great many that combine milk and beef to a profitable degree, but a good carcass of beef from a steer of a

pronounced dairy type or breed is rarely seen. So clearly and definitely is this beef type established that to depart from it means to sacrifice beef excellence.

The accompanying illustrations (figs. 1, 2 and 3) pretty accurately represent the ideal beef

FIG 2.—High-grade Shorthorn steer.

type. The first is a good reproduction from a photograph of a prize-winning Angus heifer exhibited by Queen Victoria at one of the late Smithfield fat stock shows. The next is a portrait of a high-grade Shorthorn steer, raised as a skim-milk calf at the Iowa Experimental Station. He

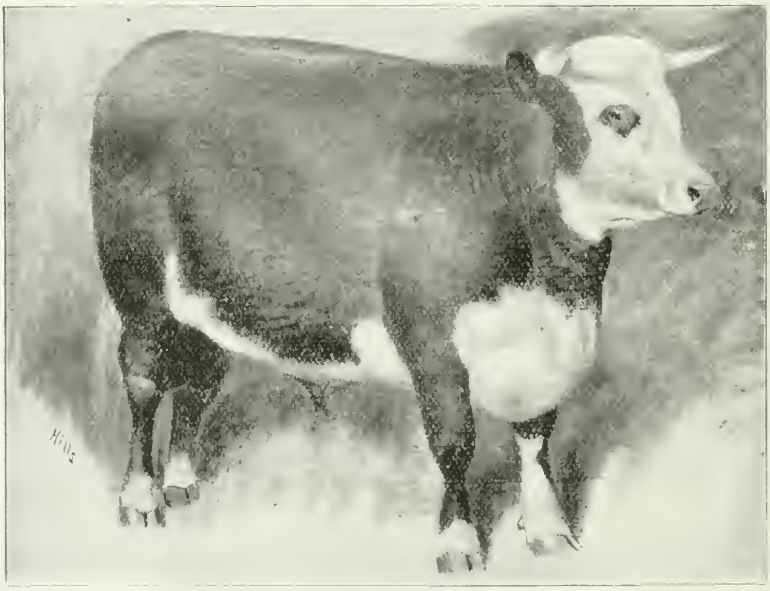


FIG. 3.—High-grade Hereford steer.

was the best steer in the Chicago yards on a day when there were 26,000 cattle on the market. The third is of a high-grade Hereford steer, fed at the Iowa Experimental Station, that was

good enough to easily top the market, and was one of a carload to dress an average of 67.5 per cent. of net beef. He weighed 1,620 pounds when 2 years old.

These animals, though representing different breeds, present that compactness of form, thickness, and substance, together with superior finish and quality, coupled with an inherent aptitude to lay on flesh thickly and evenly, that always characterizes the beef animal of outstanding merit.

These points are more specifically itemized in the following score card prepared for the use of students at the Iowa Agricultural College :

Scale of Points.

	Possible score.
A. General Appearance (25) :	
Weight—Estimated ——— lbs. ; actual	
Form and size, smooth, even, parallel lines, deep, broad, low set	10
Quality, thick covering of firm flesh, mellow touch, soft heavy coat, fine bone, velvet-like skin	10
Style, vigorous, strong character, active, but not restless	5
**Objections*, rough or angular in form, harsh coat, hard skin, dull appearance	
B. Head and Neck (10) :	
Muzzle, broad ; mouth large, jaws strong, nostrils large	2
Eyes, large, clear placid	2
Face, short ; quiet expression	1
Forehead, broad, full	1
Ears, medium size, fine texture	2
Neck, thick, short and full, throat clean	2
Horns, fine texture, medium size or small	
**Objections*, long or lean head and neck, dull eyes, coarse, heavy horns	
C. Forequarters (10) :	
Shoulder, covered with flesh, compact on top, smooth	4
Brisket, prominent and wide	3
Dewlap, full, skin not too loose and drooping	1
Legs, straight, short ; arm full, shank fine, smooth	2
**Objections*, bare shoulders, narrow on top, contracted brisket, coarse legs	
D. Body (35) :	
Chest, full, deep, wide ; girth large ; crops full	8
Ribs, long, arched well covered with firm flesh	7
Back, broad, straight, smooth, and even	10
Loin, thick, broad, full	6
Flank, full, even with underline, or nearly so	4
**Objections*, Narrow or sunken chest, hollow crops, sloping ribs, bare or rough back and loin, high flank	
E. Hindquarters (20) :	
Hips, wide, smooth, well covered	5
Rump, long, even, wide, smooth, not patchy	4
Pin bones, wide apart smooth, not patchy	2
Thighs, full deep and wide	2
Twist, full, deep, large, level with flank or nearly so	3
Purse, full, indicating fleshiness	2
Legs straight, short, shank fine, smooth	2
**Objections*, prominent rough hips, narrow or bare rump, spare thighs, light twist, small purse, coarse legs	
Total	100

The Use of the Score Card.

The score card is an educator and of great advantage to the student, but its use is not generally favored in the show ring by leading judges. The judge who goes into the show ring,

* The score card as used in the classes contained an additional column for marking the student's estimate of deficient points.

like the expert buyer in the great markets, should carry a well-defined mental conception of a good animal and be able to detect at once the qualities that are objectionable. This applied to the animals of a ring virtually amounts to the use of a score card without the objectionable features of that system. In recommending the score card to the student, the term "student" is used in its broadest sense, embracing not only the prospective breeder within the class-room, but every member of the great practical school as well who wishes to keep in the foremost rank of his profession.

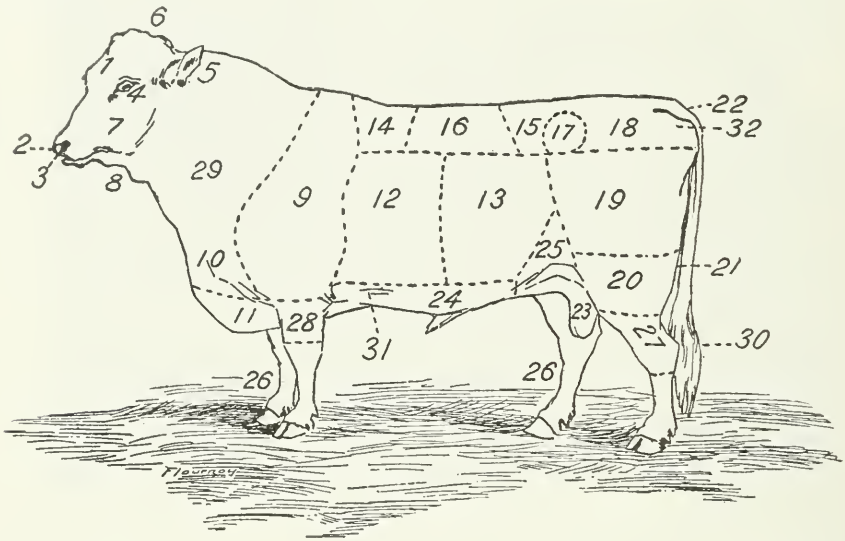


Fig. 4.—Points of a beef animal.

1. Forehead and face.
2. Muzzle.
3. Nostrils.
4. Eyes.
5. Ears.
6. Poll.
7. Jaws.
8. Throat.
9. Shoulders.
10. Chest.
11. Brisket.
12. Fore ribs.
13. Back ribs.
14. Crops.
15. Loins.
16. Back.
17. Hooks.
18. Rumps.
19. Hindquarters.
20. Thighs.
21. Twist.
22. Base of tail.
23. Cod purse.
24. Underline.
25. Flanks.
26. Legs and bone.
27. Hocks.
28. Forearms.
29. Neck vein.
30. Bush of tail.
31. Heart girth.
32. Pin bones.

It is not necessary here to take up in detail all the points enumerated in the foregoing score card, but it is proper to discuss briefly the controlling principles and logical reasons that govern the formation of a standard of excellence of this nature. The analytical method of resolving every problem into scientific formulas and principles, based on the firm foundation of unquestionable truth, is the intelligent method of study and investigation, and this method ought more generally to prevail in agriculture.

Beef Characteristics Briefly Defined.

The first thing that should be looked to is the general beef form—low, broad, deep, smooth and even, with parallel lines. No wedge shape or sharp protruding spinal column is wanted for the block. Next in importance is a thick even covering of the right kind of meat in the parts that give high-priced cuts. This is a very important factor in beef cattle that is often overlooked. The accompanying illustration (fig. 5), represents the wholesale method of cutting beef, showing the relative importance and value of the different parts. In a test made in Chicago on six representative beef animals—two Shorthorns, two Angus, and two Herefords—fed and marketed by the Iowa Experiment Station, the cuts designated as "rib" and "loin" averaged 27.8 per cent. of the aggregate weight of the carcass and sold for 63.9 per cent. of the total value. By this method the chuck, or shoulder, and rib cuts are divided between the fifth and sixth ribs, and in doing so the knife is run close up to the shoulder blade. The rib and loin cuts are divided between the twelfth and

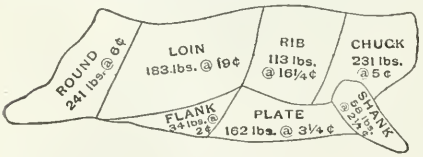


Fig. 5.—Chicago wholesale dealers' method of cutting beef.

thirteenth ribs, and the loin is separated from the "round" at the point of the hip. In cutting for the retail trade the "rib roast" is taken from the cut designated "rib," and the "porterhouse" and "sirloin" cuts are taken from the loin cut. Tenderloin steak is taken from the inside and just beneath the ribs on either side of the spinal column, and the commercial beef tenderloin always comes from inferior stock, mainly from "canners." That class of cattle has no other meat that is desirable for the block, and the tenderloin strips may be pulled out and put on the market, while the remainder goes into the boiling vats for canned or pressed beef. To take tenderloin steak from good carcasses would destroy the value of the "porterhouse" cuts. This the dealer never does. The other retail cuts and their relative values are shown in the second diagram (fig. 6). The third illustration (fig. 7) represents the retail method of English butchers.

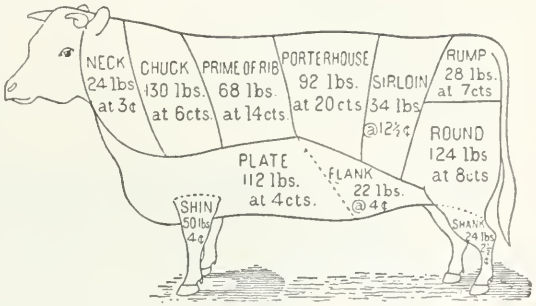


FIG. 6.—Chicago retail dealers' method of cutting beef

The Chicago and New York markets discriminate more sharply and present a wider variation in the relative price of the prime and coarser cuts than any other markets in the world. By reference to the wholesale method of cutting beef used by Swift & Co., and the actual wholesale selling prices of the several cuts taken from a bunch of cattle sold this firm by the Iowa Experiment Station, it will be seen that the rib and loin cuts command over four times the average price paid for the remainder of the carcass, and it is apparent that the practical beef animal must be good in these parts. Broad, well covered backs and ribs are absolutely necessary to a good carcass of beef, and no other excellencies, however great, will compensate for the lack of this essential. It is necessary to both breed and feed for thickness in these parts. And mere thickness and substance here are not all. Animals that are soft and patchy, or hard and rolled on the back, are sure to give defective and objectionable carcasses, even though they are thick, and they also cut up with correspondingly greater waste.

A marked and important change has taken place in the profitable type of cattle within comparatively recent years. This change is strikingly illustrated in the development of the Shorthorn. By the courtesy of that veteran feeder and most excellent authority on live stock, the late William Watson, I am permitted to furnish a good illustration (fig. 8) of the popular type of beef animal about the beginning of the present century. At that time Culley said, in one of his contributions on live stock, that the "unimproved" breeds of Teesdale were a "disagreeable kind of cattle, that, though fed ever so long, never produced any fat, either within or without." Youatt, another celebrated author, described them as 'generally of great size, thinskinned, sleek-haired, bad in handling, coarse in offal, and of delicate constitution." With this as a foundation stock, it is not so difficult to understand how an animal of the Newbus ox stamp might be classed as belonging to the improved order. This ox was sired by a grandson of Charles Colling's celebrated bull "Old Favorite," and the dam was supposed to be a Scotch Highland cow. The early Shorthorns were large and massive. The famous Durham ox weighed nearly 3,800 pounds when 10 years old. The demand for early maturity and plump, sappy carcasses of medium weight and minimum offal and waste had not then set in. It was not until within recent years that the heavy, inordinately fat, or rough and patchy bullock, became unpopular to such an extent as practically to drive this class from the market and to banish the type from the breeding herds. It is well that this was done, for the modern type, represented by the first three illustrations, makes beef at decidedly more profit and economy to both the producer and the butcher and furnishes the consumer a far superior article.

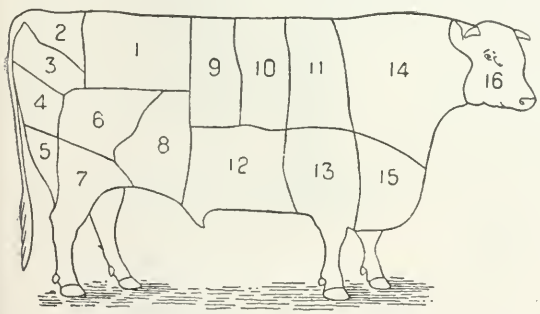


FIG. 7.—English method of cutting beef.

The parts furnishing the high-priced cuts must be thickly and evenly covered with firm yet mellow flesh of uniform good quality and alike free from hard rolls and blubbery patches. Coarse, harsh, and gaudy animals will no longer be tolerated, much less those that are bony and

bare of flesh on the back and ribs. The men who buy our cattle and fix their market value are shrewd enough to know almost at a glance how much and just what kind of meat a steer or carload of steers will cut out, and if the producer overlooks any of the essential points he is compelled to bear the loss.

Then, in addition to securing the general beef form and make-up, together with good backs, ribs, and loins, there is a certain quality, character, style, and finish that constitute an important

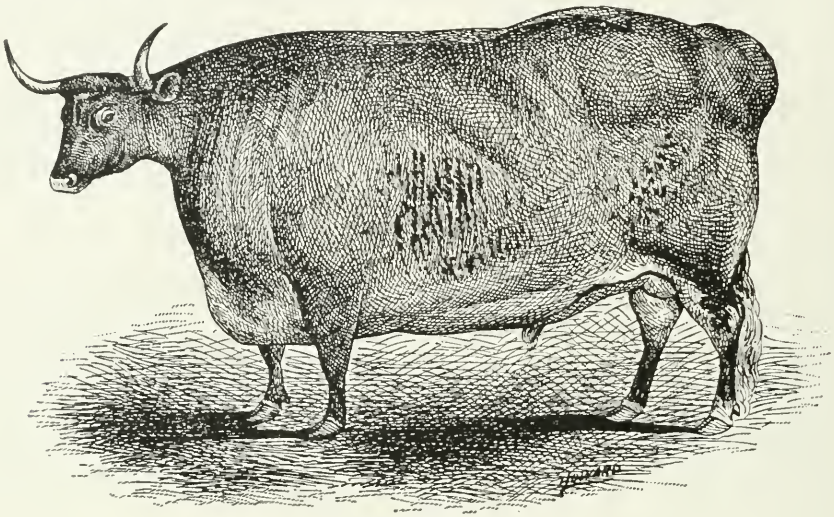


Fig. 8.—Newbus ox.

factor in determining the value of beef cattle. One of the first indications of this is to be found in the skin and coat. A good feeding animal should have a soft, mellow touch and a soft but thick and heavy coat. A harsh, unyielding skin is an indication of a sluggish circulation and low digestive powers. The character and finish exemplified by a clear, prominent yet placid eye, clean-cut features, fine horn, and clean, firm bone, all go to indicate good feeding quality and a capacity to take on a finish of the highest excellence, and consequently to command top prices. Coarse-boned, rough animals are almost invariably slow feeders and hard to finish properly. A certain amount of size is necessary, but it should be obtained without coarseness. The present demand exacts quality and finish rather than size.

Besides these qualities, and above all it is necessary to have vigor and constitution. We find evidence of these in a wide forehead, a prominent brisket, broad chest, well-sprung ribs, full hear girth, and general robust appearance ; and without these, other excellence will not have its highest significance.

Excellence for the Block Due to Inherited Quality Rather than Feed or Gain.

The misleading practice of rating beef animals mainly by the gains made in the feed yard is altogether too common. The distinction between cattle of different types is absolutely essential to profitable feeding. There is not a very great difference in the rate of gain, or the number of pounds of increase in weight from a given amount of feed, that will be made by a representative of the best beef breeds, or by a genuine scrub, a Jersey or a Holstein steer. This statement may seem somewhat at variance with prevailing opinion concerning the potency and superiority of improved blood. Practical breeders and improvers of live stock have been rather reluctant to recognize this doctrine, and a good many will not concede it yet, but the evidence is constantly accumulating ; the principle has been repeatedly demonstrated, and it is useless to ignore facts.

After all there is no well-founded reason why a Shorthorn, an Angus or a Hereford should make more gain in weight from a bushel of corn than a native or scrub. This is governed altogether by the digestive and assimilative machinery of the steer. The Holsteins, for instance, are well known to be hardy and extremely vigorous eaters. They consume large quantities of feed, and render good returns for their rations, and the despised scrub has a ravenous appetite,

and is almost as omnivorous as a goat. It is not reasonable to expect that the improved breeds, notwithstanding their superiority in other respects, have inherited any greater constitutional vigor or more perfect working organs of digestion than those animals belonging to the class designated as natives, or scrubs, which, from the nature of their surroundings, and the very law of their existence, have been inured to all kinds of hardship. Nature's law of the survival of the fittest was more rigid and exacting than the selection of the average modern breeder. Why, for instance, should a Shorthorn or a Hereford steer be able to utilize a larger proportion of a given ration than a Holstein? Has not the latter been as highly improved, as carefully and as continuously bred for the express purpose of making good return for a liberal ration? Scientists have discovered that civilized man has no greater powers of digestion than the barbarian or the Indian. Neither has the improved steer materially better digestion than the native. The feeder is often deceived in the belief that he has a good bunch of cattle simply because they feed well and gain rapidly. Economy of production is an important factor, but it is by no means all. It is even more important to have a finished product that the market wants and will pay for than it is that it should simply be produced cheaply.

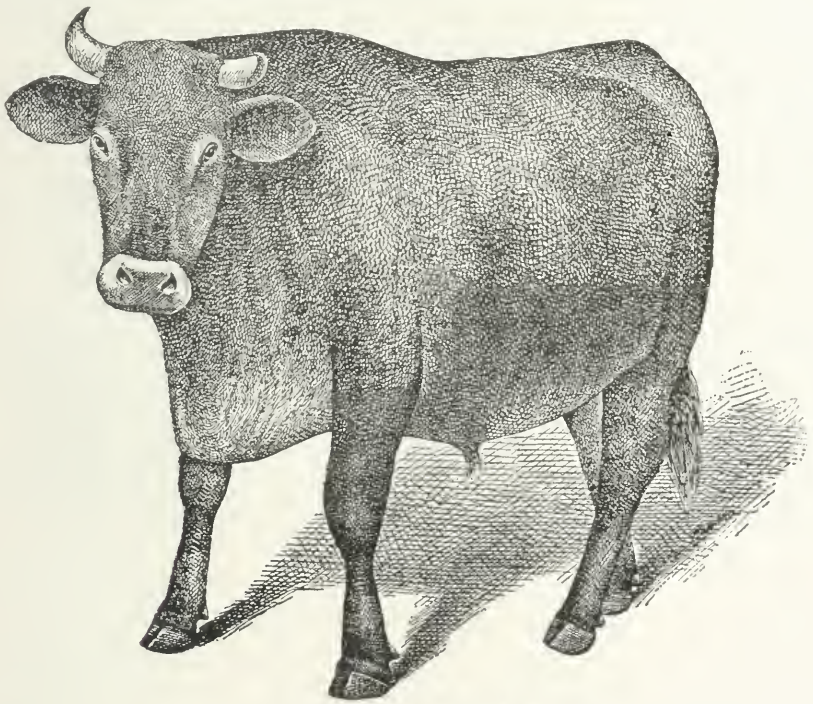


Fig. 11.—An unprofitable feeding type.

The illustration (fig. 11) represents a high grade Jersey steer, fed and marketed by the Iowa Agricultural Experiment Station. This steer was fattened and finished for market under conditions quite similar to those of the Shorthorn and Hereford steers illustrated on page 60, and the rations were practically the same.

The Types Compared

In making a comparison, only the Hereford will be used, but the distinctions are equally applicable to either. While in the feed lot the Jersey made a gain of 2 pounds a day for nine months and the Hereford 2.03 pounds a day for fourteen months. There was practically no difference in the rate and cost of gain. Judged by the record they made up to the time they went to market, the Jersey would take rank close to the Hereford in both rate and economy of gain. But the interesting part of the comparison came later. The Jersey took on flesh rapidly, and was exceedingly fat and well finished. He was as good as it is possible to make a Jersey steer. Yet, when he went to market he had to sell $2.12\frac{1}{2}$ below the top quotations, while the Hereford was one of a carload to sell 10 cents above the top for any other cattle on the market.

It is sometimes claimed that this distinction is partly due to prejudice, but since I have followed cattle through the feed lot and to market and onto the block, carefully ascertaining all the facts for several years, I am convinced that the expert buyers who fix the price for beef cattle in the great market centres rate them strictly on their merits, entirely independent of any breed or type consideration. The controlling factor is the utility and inherent value of the animal for the practical test of the butcher. The slaughter and block test clearly revealed the reasons for this marked distinction in the selling value of these two steers.

The Jersey belongs to a breed that has been developed for centuries for the specific purpose of making butter; that is, putting the product of its feed into the milk pail. They are rough, angular and bony, and when fattened they do not put the fat into the tissues of the high priced cuts of steaks and roasts on their back, as a representative of the beef breed does, but this steer had 190 pounds of what is termed loose, or internal, tallow and 55 pounds of suet on a 763-pound carcass; that is 32-3 per cent. of the steer's carcass was tallow. Tallow was at that time worth 4 cents a pound, while the best loin cuts were worth 19 cents at wholesale. And besides that, this steer only dressed 57.5 per cent. of beef, while the Hereford dressed 67.5 per cent. Then, the Hereford had only 95 pounds of tallow and 38 pounds of suet on an 888-pound carcass, equivalent to 15 per cent. And besides this striking difference in the percentage of meat in the high-priced cuts, the meat of the Jersey was much inferior to that of the Hereford. The Jersey steer went on accumulating fat around his paunch and internal organs to the extent of nearly one-third of his entire body weight, while he did not have meat enough on his back to decently cover his bones. This explains why a Jersey or a Holstein, or any other animal not expressly bred for beef, can never be made plump and smooth, no matter how long it is fed or how highly it may be fattened. Besides, what scarcity flesh that is there will be found of inferior quality owing to the absence of that fat deposited throughout the tissues of the meat that is necessary to a ripe, juicy and highly flavored cut. There is a fundamental and essential reason why rough cattle do not sell. These same distinctions are largely true of the native and all other unimproved cattle when an attempt is made to fatten them for beef. The men who buy them are well aware of these distinctions and they fix their market values accordingly.

It is of vital importance, then, that the feeder should have the right kind of cattle for fattening. The Jersey and the Hereford steers previously referred to made practically the same gains in the feed lot and at substantially the same cost per pound for feed consumed, but the market comparison revealed the fact that the steer of beef type and inherited beef-making capacity was making a product worth 49 per cent. more than the other steer, and this increased value not only applied to the gain made in the feed yard, but to the entire carcass as well. The feeder cannot afford to ignore these distinctions. They are of vital concern and determine profit or loss. If the producer were hauling his corn or other products to market, instead of feeding it to cattle, he would not hesitate to select one that would return 49, or 25, or even 10 per cent. more than another. The loss can not be afforded in either way.

RAISING GOOD CALVES ECONOMICALLY.

The ever-increasing competition in certain food products for the farm, due to the extension of dairying and beef raising, renders it of the greatest importance that farmers who raise their calves while shipping milk to the cheese factory, creamery, or to supply the large demand from cities, should consider carefully how this can best be done without lessening too much on the daily milk output. The difficulty the dairy farmer finds in raising good calves from his own superior milking stock, while all or nearly all his whole milk is sold, has debarred many a one from attempting to do so, and he has had to be content with filling up the vacancies in his herd by purchase, a method that is very often most unsatisfactory. The creamery patron is not in such a bad position as the one who sends milk to the cheese factory, because he can get back his skim-milk, and by adding oil meal and other substances can furnish his calves with something nearly akin to whole milk. But even he labors under a disadvantage, inasmuch as the skim-milk is often sour in hot weather when he gets it back, and sour milk for calves is not a satisfactory feed. Where the farmer has his own separator, however, this disadvantage is removed and he can utilize skim-milk with the best results.

With the farmers who raise calves for beef purposes the case is somewhat different. A great many of them raise their calves on whole milk, for some time at least, and those who use skim-milk can have it fresh, because, as a rule, no milk is sent to the factory or creamery. It must be conceded that the finest beef calves are raised on whole milk, but the question arises whether a greater profit could not be obtained by utilizing the cream for butter-making or sending the whole milk to the factory, substituting therefor either skim-milk, buttermilk or whey,

with the addition of certain fatty substances, or by using in part or entirely one of the useful calf foods which can now be purchased at prices that make them profitable to use. These various methods will be discussed in turn.

Raising Calves for the Dairy on Skim-milk. Where butter-making is largely practised, the greater part of the skim-milk which is available for feeding purposes is separator milk, out of which has been extracted the greater portion of the butter-fat, the amount remaining in it depending, of course, on the care or want of care with which the extracting has been done. In the old methods of setting milk, the butter-fat was never removed so closely as is done to-day by means of the separator, and therefore, skim-milk, before the separator came into general use, was richer in feeding properties on account of the butter-fat remaining in it. This fat, however, though serving a good purpose, was yet too costly a food, because when recovered from the milk it could be made into butter which would bring more than its worth for calf feeding purposes. But, supposing that every atom of the butter-fat was extracted from the milk, we have yet in the skim-milk remaining the most important part of the milk for feeding purposes, viz., the protein, the percentage of which is a little larger in the skim than in the whole milk, and from which are principally formed the bones, ligaments, muscles, nerves and internal organs of the animal. In skimming milk that tests 4.2% fat we remove one-quarter of the total solids, and there is left in the skim-milk about 9.16% of solids, not fat, and from .1% to .2% of fat. Now, it is evident that if we can replace the butter-fat extracted from the milk by one or more feeding substances that contain nearly, if not quite, as good feeding qualities as the fat, and the primary cost of which is much lower, the substitution of these must be profitable. In linseed or oil meal, and in prepared calf foods, we have nearly ideal foods to add to the skim-milk to bring it up to the desired standard. The average proportion of oil in crushed linseed meal is about 35%. Whole milk is composed of eight parts of water, by weight, to one part of solids. The very first essential in calf raising is to preserve this relation between water and solids undisturbed as much as possible when the milk is given the calf; also to have the substitutes for whole milk in such a condition that they can be digested without difficulty.

Developing the Dairy Habit in the Young Calf. It is a fundamental law among dairymen that the calf destined for the dairy should never be fed a ration conducive to the putting on of fat. When once the flesh-forming habit has been acquired by the young growing animal it remains with it all its life, and, consequently, the animal's usefulness for the dairy is very seriously impaired, even if not utterly ruined. This must be carefully borne in mind when the dairyman selects his rations to add to the skim-milk allowance.

As soon as the calf is born, it is wise to remove it at once from its mother to a separate pen where it should be thoroughly rubbed dry with a cloth. Some prefer to let the cow do the rubbing and cleaning process, but it is doubtful if any good is served thereby, and in the case of a heifer with her first calf, the longer she is left with the calf the more troublesome she is likely to be when she is milked, especially as regards holding up her milk. Teaching the calf to drink is not as a rule a troublesome process when it is removed from its dam before it has sucked. By using two fingers, the calf is soon induced to lower its head into a pail, and it is not long before it will drink of its own accord. By those who dislike the trouble of teaching the calf, the calf-feeders that can be obtained in any city will be found advantageous. If the calf should prove obstinate when being taught and the milk gets cold, warm water should be added in order to keep up the required temperature, otherwise disarrangement of the bowels may be looked for. The milk, whether whole or skim, should always be fed at a temperature of 98 degrees to 100 degrees. Cold milk or scalded milk soon causes indigestion and scouring.

Feed New Milk for a Week. Nature has specially prepared the first milk of the dam for cleansing the bowels of the young calf, and therefore, this should always be given to it. The time when the milk resumes its normal character varies from three to four days, or perhaps a little longer. In actual practise it is proved desirable to give the calf whole milk for a week at least, and some continue it for a fortnight. One quart is quite sufficient at first for a meal and should be given three times a day. Frequent feeding of a little at a time every day is far better than feeding a quantity twice only. Never give more than two quarts at a feed to a young calf. A good way of ascertaining whether a calf has had enough is to watch its sides, and when they are flush with its shoulders and hips remove the pail. Small calves, such as Jerseys, require less than larger ones. Another important point is to watch when whole milk is being fed that the mother's milk is not too rich for the young calf, because milk that tests high in butter-fat will be very liable to upset the young animal's digestive organs. At the end of the first or second week commence gradually to substitute skim milk for part of the new milk, the amount changed varying according to the disposition of the calf. Some will resent the change, others will not. Be careful to have the milk warmed to from ninety degrees to ninety-eight degrees, but not exceeding 100° F. A simple way to bring it to this temperature is to place the vessel containing the milk in hot water. All risk of burning and boiling is thus obviated.

Where the milk is separated directly after milking, it will be warm enough to feed without heating if given to the calves at once. To prevent calves drinking too fast, a practice which sometimes causes scouring, it is an excellent plan to add a few bread crumbs or small pieces of stale bread to the milk. Too much stress cannot be laid on the absolute necessity of cleanliness in the vessels and pails in which the milk is heated and fed to the calf. A little of the previous meal's milk left in the crevices or on the sides of the pails will soon cause an enormous increase of the bacteria that sour the milk, and the consequence will be derangement of the digestive organs and a calf "off its feed." At the end of a week after the gradual change from whole milk has begun, the calf should be so accustomed to skim-milk that its milk ration should consist entirely of it. As soon as the animal shows a disposition to nibble at food, put a few whole or ground oats in its manger, and it is surprising to see how quickly it will learn to eat them. The manger must be watched, however, and the uneaten grain removed before it becomes sour —a little good clover hay should now be provided.

Substitutes for Butter-Fat in Whole Milk. When the change to skim-milk is made, it becomes necessary to add something to the ration to make up for the butter-fat previously fed in the whole milk. For calves intended for the dairy there is no better substitute than flax seed or linseed meal. To prepare the former, take a quart of it, let it soak for six hours in from six to eight quarts of water, then boil it for an hour. It will then be in the form of a jelly. Give the calf one-half teacup full at a meal in the warmed milk, and gradually increase the jelly as the calf grows. Do not feed too much at a time because it is a laxative, and heavy feeding of it also tends to the formation of too much flesh. If desired, the flaxseed can be added to the milk while being boiled before it forms into a jelly The addition of a little salt to the flax seed when boiling acts as an aid to digestion. When linseed meal is used, take equal parts by weight of linseed meal, fine oatmeal that has been run through a sieve to remove the hulls, and wheat bran mixed, about one-half pound for each calf. Stir this in water and boil slowly for one-half hour, then add it to the skim-milk, keeping the mess stirred while feeding. Some feed jelly for one or two months then change to linseed meal, feeding it dry with ground oats, using four to eight ounces a day of the linseed meal and increasing it to a pound when the animal is six months old.

Other Substitutes. An English dairy farmer, who has evidently some new milk to spare, gives the following as his method of feeding calves : He makes a porridge of four quarts of corn meal, two quarts of ground buckwheat, four quarts of wheat bran and two handfuls of linseed meal. Each calf receives a heaping tablespoonful for each meal, which is made into a porridge with water and added to one quart of sweet milk in which a pinch of salt is put. The grain is gradually increased each week. As regards this ration it may be said that skim-milk could well be substituted as more economical than new milk, and also that the feeding of corn meal and ground buckwheat would have a tendency to induce flesh forming habits in the animal. The Iowa Experiment Station, it is true, has had better success with corn meal than with linseed meal as a fat substitute, but its experiment was more in the line of animals destined for feeding purposes than for dairy use. Good results have, however, been obtained by the following mixture in which corn meal has a share :—skim-milk twenty pounds per day, corn meal 1.5 pounds, flaxseed 1 ounce. This ration is for a calf that has had a good start, beginning with twelve to sixteen pounds of skim-milk per day in which one-quarter to one-half pound of ground linseed has been mixed.

Some breeders use an oatmeal porridge composed of two pints of oatmeal and one-half pint of linseed meal boiled with sufficient water to make it of the right consistency. This when stirred in with skim-milk constitutes a feed for a calf for one day. As stated above, care must be taken when the calf is young to remove all oat husks from the meal before it is boiled. Then there are the various calf meals which can be used in connection with skim-milk, but as these will be discussed further on no more need be said of them just here. Alternate substitutes for oil meal are gluten meal and even boiled mashed potatoes which have been advantageously used in some instances, although their composition would not lead one to think that they would be of much value in calf feeding.

As the calf grows, the substitutes for fat in the skim milk are to be increased from time to time, but not beyond a certain extent. The increases should rather be made in the dry grain ration fed in addition to the skim-milk and mixture as soon as the calf will eat it. For the ration of grain fed dry there is nothing better than ground oats and bran, which furnish material to build up the frame of the growing calf. When the milk ration is entirely dropped, which will be at any time when the animal is from three to six months according to the supply available, the linseed meal which has been given in the milk can be fed dry in conjunction with the other grains, but it is not desirable to feed it or any other flesh forming substance too heavily.

Fall or Spring Calves. The question of whether cows should drop their calves in the spring or fall is one that must be decided by each dairyman according to whether he practises

winter dairying or not. As regards the calves, the fall dropped calf as an opportunity to acquire good growth before spring, when it can run out on pasture. It can also be fed ensilage which has been successfully tried in many instances with calves, and fallen apples cut up fine are also a suitable feed. When calves are dropped in the spring they should not be turned out to pasture in the hot weather. If they are turned out under a mistaken idea of economizing, the young things will suffer as much from heat and be so tormented with flies that their growth will be stunted, and any saving of feed will be much more than counterbalanced by their lack of growth and thrift. Those who treat their calves in this manner must remember that, while the flesh forming habit should not be encouraged among dairy calves, yet a continuous, steady, natural growth is always desirable, and any check thereto is harmful to the future success of the animal's career. The necessary exercise for the calves is best obtained by letting them run in a small paddock in the cool of the evening or early in the morning before the flies get troublesome.

Some Requisites for Calf Feeding. Always keep the calf pens dry and clean, using plenty of litter. A dirty pen is conductive to scouring, that bane of the young calf's existence. When several calves are fed together it is best to fit up on one side of the pen as many narrow stalls as there are calves. In the partition in front of these stalls there should be cut holes for the calf to put his head through to drink out of a pail placed outside. At the back of the stalls can be placed doors fitted loosely between cleats, which can be raised by means of ropes and pulleys before the calves enter the stalls, and dropped as soon as they are inside. If doors are not used small stanchions can be fitted in the parts of the stalls and the calves fastened there as long as it is desired. By this means the weaker calves get their full share of the milk with no risk of being robbed by the bigger ones. After the calves have finished drinking it is well to keep them tied or fastened in their stalls for a little while, until they have got over the excitement of drinking. Unless this is done there is the danger that some of them may acquire the practice of sucking the ears, navels or teats of the others which often times causes bloating, not to speak of occasional injury to the animal sucked. To prevent this taking place and to divert the animal's attention a good practice after they have drunk their milk is to feed some dry oat meal and bran in a manger placed on one side of the front of the stall, just as soon as the animal will nibble at it. After it has eaten a little it forgets its sucking propensities and will not molest its companions.

Remedies for Scours. The most frequent and troublesome disease that affects calves is scouring. Various causes for it have been given above, which it will be unnecessary to repeat here. If steps are taken to remedy the trouble at once a cure is soon affected. If milk has been fed too cold or too hot see that it is given at the proper temperature and perfectly sweet, and be sure that the pails are thoroughly clean. If the pens are dirty, clean them out and furnish with plenty of bedding. Sometimes boiled milk which has been allowed to cool to a suitable temperature will cause the disease. In other cases a little charcoal together with five to ten drops of rennet extract is very efficacious, especially where wind colic is present. Raw eggs given whole with the shell crushed fine are often administered, the lime in the shell being particularly good for this trouble. Lime water is a favorite prescription with many, while in severe cases a cure is generally speedily worked by discontinuing the milk for a little while and giving a small dose of castor oil to remove the source of the disorder in the bowels.

Gains in Weight on Skim-milk. Excellent gains in weight have been made with calves on skim-milk and grain and linseed meal as described above. At the Massachusetts Station the average gain was 1.49 pounds per day for seven calves. At other Stations the gains have reached from .95 to 1.72 pounds a head per day according to age, and the value of skim-milk for calf raising has been shown to be from twenty-five to thirty cents per 100 pounds. Stewart in his work "Feeding Animals" reports a number of calves in his experience that made an average growth of two pounds per day for the first ninety days, and individuals were doing equally well when older.

Buttermilk. Buttermilk is occasionally fed to calves. Its feeding value is not very far below that of skim-milk but it has to be fed with care as it is apt to upset the digestion unless it is fed quite fresh, and therefore, if possible, it should be kept for feeding to pigs, as they will do better on it than calves.

Whey. Whey is sometimes utilized as a substitute for skim-milk to feed to calves, but it can only be successfully used when fed with care and forethought. In comparison with skim-milk it is by itself a poor food, because the casein, the most valuable constitutent of skim-milk, has been all removed, and the milk sugar, the principal constituent that remains is a carbohydrate and belongs to the class of the cheapest food products. There is a small amount of albuminoids, however, about .8 per cent., also present in it. The value of whey is not more than one-half of that of skim-milk. It should never be fed alone with the expectation of raising good calves.

To ensure success with whey-feeding it must be fed sweet—a difficult thing to be managed when it has to be brought back from the factory, because it is generally sour before it leaves there, and it must be warmed to a proper temperature like skim-milk. Then to bring its feeding value up to a standard akin to whole milk there must be added, for a young calf, one-quarter pound of linseed meal to each gallon of whey. When the calf is about a month old, add one-quarter pound of bran to each gallon of whey mixture, or, instead of bran, an equal quantity of ground oats or barley which has been scalded in whey or water. A dairyman writing in the *Ohio Farmer* carried out the following method of feeding whey: His calves are dropped in the spring. New milk is given till the calves are three to four weeks old. Then whey is gradually substituted for the milk, until, at the end of a week, whey had entirely taken the place of the whole milk. The fat in the ration is made up by adding to the whey Old Process oil meal. When the whey soured in the hot water, hay tea was substituted for it, and oil meal and water and a little bran were added. Two tablespoonfuls of oil meal were given to each calf. This correspondent, after trying whey for sometime, finally discarded it altogether, using the hay tea instead from the first.

Some claim to have been successful in raising calves even whey the whey fed was soured, but this plan is not to be commended, and for anyone who meets success with feeding sour whey there will be ninety-nine whose calves will sour, be off their feed and die. Nevertheless, if whey can be obtained and fed to calves in a fairly sweet condition, good success can be secured in raising them, if it is supplemented by a suitable food such as oil meal. This furnishes a good proportion of muscle forming food and of ash, which is made up of phosphate of lime, magnesia, potash, soda and other substances which are needed to build up the bones and frame of the calf. Later on, when the calf is about a month old, one-quarter pound of wheat bran, ground oats and barley to each gallon of whey is added. This extra food given with the whey is certainly not expensive, not costing more than $5.50 to feed a calf on for six months, supposing the calf takes four gallons a day. Calves thus fed have weighed 500 pounds at that age.

Feeding Calves without Milk.

We have seen that dairy calves can be successfully raised on skim-milk and whey, provided that proper attention and care are given to certain important particulars, and that the standard of the equivalent of the butter-fat in whole milk is made to correspond to that of the butter fat. It now remains to be seen how calves can be raised without any milk at all except perhaps for the first week, while the mother's milk is getting into a normal condition.

Hay Tea. The oldest method known of raising calves without milk, and one that is practised with good success at the present day, is by means of hay tea. Good clover hay which has been cut early is taken, cut five-eighths of an inch long, and boiled for one-half hour. Three pounds of hay are allowed for each calf. After the hay is boiled the short hay is placed on a wire cloth sieve and strained, while the flaxseed and middlings to be mixed with it are put into the kettle with the hay extract and boiled to a jelly. Two gallons of the tea, in which one-quarter pound of flaxseed and one-quarter pound of wheat middlings have been boiled, are given each day to a calf thirty days old. At the end of sixty days the wheat middlings are increased to one-half pound per day. The boiling extracts, the soluble nutritive constituents of the hay, and this extract contains all the food elements required to make the animal grow and is, moreover, as digestible as milk. Gains per day of two pounds per head and over have been reported in calves up to two months old that were fed on the extract of tea, flaxseed, and middlings. To ensure success, however, the hay must be well cured, bright and of good quality, and the tea be fed at a temperature of 90 or 92 degrees F. Very often the extract is weak in albuminous and fatty matter on account of being made from late cut or purely cured hay, or the mistake is made of adding too much water. Under the circumstances it is not surprising if the calves do not make a good, healthy growth.

The hay tea can be fed to calves until they can do without it, its place being then taken by pasture or green feed in the pen. Some discontinue it when their calves are three months old but continue the oil and bran in a dry state all the summer; or these can be mixed with water if this is considered advisable. The steeped hay after the tea is extracted is greedily eaten by horses and cattle, but, of course, much of its goodness is removed in the boiling. For older animals, however, this loss might be replaced by other feed substances if a shortage of hay renders it necessary to feed the hay from which the tea was made. The hay tea can be profitably fed in conjunction with a little sweet skim-milk for a time should there be a sufficiency of the skim-milk to warrant this.

Alternative Foods. A porridge made of oil meal, shorts and bran, to which fine oatmeal is added as soon as the calf grows a little, has been the medium by which many good calves have been raised. It should, like other milk substitutes, be fed at a temperature of not less than 90 degrees.

Oat Extract. A correspondent of *Hoard's Dairyman*, who is a medica man, had conducted some experiments in the line of substitutes for milk for calves. Taking as his principle the benefits conferred on dyspeptics who use extracts of malt, he prepares an extract of oats which he has found very beneficial for feeding calves. He gave whole milk for a week and then commenced mixing the oat extract with the milk. At the end of another week the calf received nothing but the extract. This was made by soaking oats for 48 hours, then the water was drained off and they were allowed to sprout. The experiment was carried on in winter and the oats were spread out in a shallow pile on the cellar floor, where the furnace was. They were turned once or twice a day till all were well sprouted, then dried quickly without cooking, when they were fit for use. A gruel of oil meal was then made, and after this was cooked below a cooking heat, half as many oats by weight as the oil meal used were added and the mixture allowed to stand in a warm place for eight or ten hours. It was then boiled, in order that all the nutriment should be thoroughly extracted, and afterwards it was thinned to the consistency of milk. Ten pounds of oil meal and five pounds of oats make 100 pounds of this artificial milk, which has exactly the same chemical composition as skim-milk, which it resembles in appearance, except that glucose is substituted for lactose. When it is desired to veal calves, 10 pounds of this malted flaxseed, with 5 pounds of oil meal, or 10 pounds of malted sunflower seed, with 5 pounds of cottonseed meal for each 100 pounds of weight of mixture, would make, so the correspondent asserts, a liquid akin in chemical composition to new milk

A number of dairymen, especially in the United States, utilize corn meal in conjunction with hay tea, oil meal, middlings, or fine oatmeal. In some parts the comparative cheapness of corn is a great temptation to the farmer to use it more extensively than he should. As stated above, it is an excellent food to be used in moderation for calves intended for veal, or eventually as beef, but any heavy feeding of it to dairy calves is liable to result in their accumulating flesh in after years instead of devoting their energies to the production of milk. In the late winter and spring finely cut mangels are an excellent food to give calves, in addition to their other rations. If a little fine strip is put into the calf's mouth it will soon learn to eat and like it, and the roots will be a great help to digestion.

Mr. Ness' Method of Feeding.

Mr. Robert Ness, Howich, Que., has kindly furnished us with his method of feeding calves without milk, which we give in his own words. "In raising calves without milk there must be particular attention given to them, even more than to milk fed calves, as they are not usually so robust and fat. Still they can be raised more economically and profitably —more especially dairy stock. I feed them on their mothers' milk until about two weeks old. I then begin by putting in some porridge for a feed or two; each feed after that I give less milk and add more water, always keeping it as near the new milk heat as possible. Shortly after they are three weeks old they can live on porridge and water and do well. In the meal line for sometime I have used Ewing's Calf Meal with very good results. It is composed chiefly of flax seed meal. It should be mixed first in a little cold water, then scalded. Add cold water until it is about the temperature of new milk. When the calves are about five weeks old I begin mixing the calf meal with some cheaper meal, such as barley meal, and some shorts or wheat middlings. This makes a very good drink. I teach them to eat dry grain just as soon as possible, giving ground oats and barley with good clover hay. This is a preventative as well as a nourishment in case of their scouring. When they are about three months old their porridge, if any is needed, can be made of barley meal alone. I always feed each calf separately and give them as much as they should have, feeding in pails, which must be kept perfectly clean as well as their pens. In this way one can raise very good calves with a profit, if the milk can be disposed of to advantage. As soon as I have good after-grass I get the calves on it."

Raising Calves for Stockers.

All the foods previously mentioned are equally suitable for use when the animal's destination is the block, and very fair veal calves indeed have been raised on skim-milk, oil meal, oatmeal, shorts and bran. The principal objections urged by butchers against veal calves thus raised are that flesh is somewhat darker than that of whole milk calves and also that they are not so fat. As, however, we are dealing principally with calves to be raised for stockers, we need not consider these objections here, although it may be said that after all they are not very serious ones, because no consumer would be able to recognize any difference in the taste of veal from calves raised on either system. The principal difference between feeding calves for beef and dairy purposes is that in the former instance we are not so limited in the choice of grains or other rations which can be fed in addition to the skim-milk, whey, or their substitutes. We need not

be afraid of the animals getting too fat, because the chief object is to push them on as quickly as possible, and get our returns from them before they get so old that each additional pound of gain is made at too high a cost.

Corn Meal as part of the Ration. Corn at once suggests itself as a suitable grain adjunct to skim-milk, to force calves forward. We have seen above that dairymen have been able to use corn meal to advantage when it was fed in small quantities, but that if it was fed more heavily it caused the dairy calf to become too fat. As this is not a disadvantage, but the contrary, with beef calves, corn is, therefore, an excellent food for such, and its cheapness in many localities furnishes another excellent reason why it should be used as part of the young animal's food

Prof. Curtiss, of the Iowa Experiment Station, has been carrying on a series of experiments in calf feeding, using skim-milk in conjunction with various grains and feeding substances. In these tests the milk has been fed warm from the separator with the several grain rations used. Corn meal and ground flaxseed, oatmeal and oil meal were tested. Very uniform results were brought out. In each of the three experiments oil meal gave lower and more expensive gains and was in every way less satisfactory than either oatmeal or corn meal and flax seed for supplementing the skim-milk ration, and also pure corn meal proved superior to pure oil meal. The results are directly contrary to the prevailing opinion as to the relative values of these feeds, but Prof. Curtiss does not consider it unnatural that a carbonaceous grain, such as corn, should be more suitable for feeding with skim-milk than a highly nitrogenous product like oil meal. Separator skim is, as stated above, also a nitrogenous feed, and, therefore, when we use both in combination we have a one-sided ration. Corn or oatmeal gives much better results and is safer than ground flaxseed. In these experiments the flaxseed contained 55 per cent. of fat. It was used to the extent of about 10 per cent. of the grain mixture. The average daily gain during these three experiments was as follows : when oil meal and milk was fed, 1.47 pounds ; for oatmeal and milk, 1.57 pounds ; for corn meal, flaxseed and milk, 1.56 pounds. It will thus be seen that corn meal and also oatmeal are very beneficial foods for young calves destined for feeding, and in these experiments both have surpassed oil meal in efficacy and also in cheapness, although this latter feature might be considered altered in a district further removed from the great corn growing belt. Experiments as to the respective values of corn meal and other meals as adjuncts to skim-milk in calf feeding could be conducted by our experiment stations with great profit to the farmers of the Dominion.

Calf Meals. The use of calf foods, which have been specially prepared to take the place of milk and grain combinations, and thus enabling the farmer to dispense altogether with the feeding of milk, is rapidly extending, and so great is the demand for them in Great Britain that one manufacturer has a journal dealing with general farm topics which is issued quarterly in the interests of his meal, and which gives from time to time illustrations of animals which have been reared on it, some of which we have reproduced in connection with this article. The exact composition of the calf meal is of course largely kept a secret by the firms which manufacture them, but through the kindness of some of the proprietors we learn that linseed meal, wheat-flour, oatmeal, locust beans, pea-meal, and very small portions of aromatic seeds, enter more or less, in varying proportions, into most of the best known preparations, although of course the exact preparations of each constituent cannot be ascertained. It is, however, sufficient to know that in their composition the manufacturers have striven to introduce all the elements to be found in new milk, so as to make these calf foods approximate as closely as possible to nature's food for the calf. That the makers have been successful in this is shown by the results obtained from the use of calf meals of high reputation where these have been fed intelligently.

How the Calf Meals are Fed. The meal is measured according to the directions which accompany each package, then mixed with cold or tepid water to a fine paste, care being taken that it is quite free from lumps, then boiling water is added until the mixture is of the consistency of starch. It is then well stirred and allowed to stand so as to get thoroughly soaked. At feeding time enough warm water is added to increase the feed for each calf up to about two quarts, and also to warm the mixture to the temperature of the new milk. As the calf grows the gruel is increased. When it is older the meal can be fed dry in conjunction with ground oats or corn. It will thus be seen that the feeding of these calf meals is a very simple matter and can be well attended to by any intelligent person. Cleanliness in the vessels used, careful mixing and feeding at a suitable temperature are the three principal requisites.

Satisfactory Results From the Use of Calf Meals. There are very few farmers in Canada who purchase large numbers of calves to rear for the dairy or for stockers, and we know of none who purchase very young calves and feed them on milk substitutes without a drop of milk. This is, however, practiced in Great Britain, and we know of farmers in Wiltshire who raise annually 130 to 140 calves, which do not receive a drop of milk from the day they are brought home from the markets where they are purchased, but are fed on calf meal and water

until they are old enough to eat freely of hay, grain and roots, when the calf meal is mixed dry with the other grain. And notwithstanding these calves are as thrifty, well shaped, contented looking a lot as one could wish to see and are not pot bellied or scraggy, nor have they large ungainly heads ; and this is the case in spite of the fact that the farm is not well suited for calf raising, being at a high elevation and in every way more suited for sheep than for heavier stock, while the buildings are quite out of date. If, then, success can be attained under such unpromising conditions, what could be done with better surroundings? The discussions that have taken place of late in Great Britain at agricultural meetings respecting these calf foods have directed great attention to these substitutes for milk and have resulted in an increased demand for them. But to come nearer home, although the feeding of these calf foods has not been largely adopted in Canada as yet, there is nevertheless a steady and ever increasing demand for them, and they have been very successfully used by many farmers both alone and in combination with skim-milk. As will be noticed above, Mr Robert Ness, Howick, Que., one of our most advanced dairy farmers and a breeder of Ayshires, is well satisfied with the calf meal he used, and his experience is the same as that of many others who have tried one or other of the high class calf foods which are on the market. In dairy sections, especially, they must be of great value to the farmer who disposes of his milk and has none for calf-raising purposes.

Comparative Cost of Calves Raised on New Milk and Substitutes. Some of the experiment stations on this continent have investigated the respective cost of raising calves on new milk and skim-milk. The Iowa Station reports that the cost of producing a pound of gain (estimating new milk at 87 cents per 100 pounds, skim-milk 15 cents per 100 pounds, grain at 1 cent per pound, hay at $5 per ton and flaxseed meal at 3½ cents per pound) was 7.6 cents for whole milk and 5 cents for the skim-milk ration. The Pennsylvania Station estimated that it cost 9.9 cents for each pound of increase when whole milk was fed, and 3.4 cents when skim-milk was fed. In this case the former was considered worth $1.00 per 100 pounds and skim-milk 12 cents per 100 pounds. At the Mississippi Station calves fed on ten pounds of skim-milk gained nearly as much as those which received eight pounds of whole milk. The Utah Station figures out a loss by feeding whole milk to calves. We are not aware that any experiments in the line of a comparison between the cost of feeding calves whole milk and milk substitutes have been carried out on this continent, but in a Scottish experiment at Castlemilk new milk calves cost £3 0s. 8d. per head to rear, those raised on cod liver oil £1 13s. and those fed on Bibby's Cream Equivalent £1 9s. 10d. a head. In this case the cod liver oil was bought in a dear market. And not only did the artificially reared ones cost much less to raise, but, after they had all been kept on regular farm diet for some time, the animals raised on the milk substitutes sold at as high a price as those that had been fed on whole milk. Artificially rearing calves is thus proved to be not only in the highest degree successful but extremely economical as well.

CANADA'S LIVE STOCK EXPORT TRADE.

Cattle.

The amount of money that annually finds its way into the pockets of Canadian farmers who feed for the Old Country markets is quite large, and would be considerably increased if a better class of stock were handled, and the same care and skill in "finishing off" as are found in the largest and best stables were more generally practiced. During the season of 1898 there were exported from the port of Montreal 90,049 head of cattle, which with 2,187 head sent from Quebec, made a total of 101,236 head exported from the St Lawrence route. Out of this total, however, must be deducted 5,719 United States cattle which were sent via Montreal in bond. As more than a set-off against these latter about 21,548 Canadian cattle were sent from Boston and other American ports, the larger number of these being bought by an American syndicate to fill up space on steamers which they could not satisfactorily fill with animals purchased on the other side of the line. Deducting the American cattle shipped in bond there were 117,065 head of cattle fed in the Dominion, which found their way across the ocean on British, Canadian and American liners. This is independent of the thousands of stockers which were shipped to Buffalo from Ontario and other points, many of which eventually reached the Old Country in a finished condition to be classed as "Americans."

The average price per head paid for "shippers" during 1898 is given at $55 as against $60 the year previous, being a decrease of $5 a head. The total value of the Canadian cattle shipped from the St. Lawrence and American ports thus runs up to $6,438,575. As compared with 1897, there was a decrease of 20,139 head shipped from Montreal.

Buyers had much in their favor last year. They bought their cattle cheaper, railway freight rates were low, feed was cheap, while ocean freight rates were also down, and insurance also cost them only ¾ of one per cent. as against 3½ per cent. paid in former years. Gordon & Ironsides, of Manitoba, head the list of exporters with 30,641 head.

How our Cattle sell in Great Britain. In the early part of the season prices obtained in the London market for Canadian cattle ruled about 11c. per lb. They fluctuated somewhat till July, when as high as 11½c. was paid. In October prices broke down to 8½c., which was the lowest figure quoted. They afterwards rose to the same level as at the commencement of the season. As a rule the Liverpool market ruled lower than London. A satisfactory trade for a first season was done with Manchester via the Manchester ship canal. From Glasgow the returns were not very satisfactory.

Comparative Prices for Cattle from Canada and other Countries. When we come to compare the prices paid in the London market for cattle from Canada, the United States and Argentina, the results are not favorable to our stock. In May, Canadian cattle brought 11c., American, 11¼ and Argentine stock, 9½. In September we find the latter selling for ½c. a lb. more than Canadian cattle, and this advantage was retained pretty much till the end of the season, while the difference in favor of the American cattle rose to as much as 1¾c. Here is food for grave reflection. Are Canadian cattle going backward, or are the United States and Argentina stock improving while ours are only holding our own?

What are the causes of this difference in value?

These are not far to seek. During the depression which prevailed throughout Canada a short time ago, beef ruled comparatively low in price, and consequently the general run of farmers neglected their stock, used the cheapest bulls for service they could get, oftentimes a scrub one or a registered one with nothing to recommend him but his pedigree, with the deplorable results that are seen to-day. Our neighbors to the south of us, while somewhat influenced in the same manner, yet did not run to such extremes, and feeders in the great corn-growing states who knew that they could not utilize their "golden" crop to better advantage than in feeding steers and hogs for the Chicago and other markets, kept on pretty much in the same manner as hitherto, so that the general quality of their cattle was fairly well maintained. It is the possession of these bounteous crops of corn, in itself so cheap a feed, and yet so satisfactory for finishing off cattle, that gives American feeders such a pull over Canadian. Put both on the same footing as regards feed and the quality of their live stock, and this disadvantage would disappear.

As regards the Argentine cattle, the improvement in the prices received for them is the result of the steady improvement of their stock, which has been and is still being carried on with such persistence and energy. Far-seeing breeders pay good prices for thoroughbred sires and dams, and are surely and quickly reaping the benefits of their intelligent action. While a short time ago the cattle found in that country was of a kind far removed from the standard of export stock, already there are thousands of fine animals shipped to Great Britain, and their number and quality will be continually augmented. Argentina presents a splendid example of what the use of pure-bred stock can accomplish when backed by energy and intelligence.

The Sheep Trade.

The season of 1898 was a most unsatisfactory one for the sheep export trade. The principal reason for this was found in the large numbers of sheep exported to Great Britain from Ireland, in consequence of which the markets became demoralized and sheep had to be sold for whatever prices they would bring. The first Canadian sheep arrived in July and sold for 10c. a lb. During the latter part of August prices, which had previously gone up to 10½c., fell to 9c., but recovered later up to 11½c. In October they again fell to 9c., but once more reached 11½c. The average sales during the season were 32s. a head at Liverpool, 36s. at London, and 35s. at Glasgow; 34,991 head, a decrease of 26,263 as compared with the total shipments of 1897, left Montreal for Great Britain. In 1896 the number exported was 45,680. The average value in 1898 at $5 a head amounted to $174,955. Most of the sheep exported were shipped to London.

Horse Exports.

The export horse trade fell off nearly 50 per cent. in 1898 as compared with 1897. The reason for this lies principally in the fact that exporters could not find sufficient horses of the right kind to ship, and sooner than lose money shipping inferior stock, which, at best, meet only a slow, dragging sale at any time, they were content to take what few they could find to suit their purpose. 5,822 head in all left Montreal, as against 10,048 in 1897. During the season prices obtained ranged, as a rule, from £20 a head to £66 3s., the latter figure being readily obtained for heavy draft horses. One superior Canadian-bred draft horse realized £75 at the Islington cattle market. For cobs and harness horses as much as 76 guineas were given, with higher figures in special cases, as in former years most of the horses were sent to London.

GOATS FROM AN ECONOMIC POINT OF VIEW.

To such an extent has the goat come to be looked upon as merely a theme for humorous writers in the slack season of the dog days that we are apt to forget that apart from its propensities for butting, and devouring what seem hopelessly indigestible articles, it possesses, when viewed from an economic standpoint, characteristics which should commend it to the attention of those whose lot is cast in rocky districts such as are found in Muskoka, Algoma, and also, in a limited degree, to those who live in the outskirts or within a reasonable distance of large cities. As regards the former, the advantage will be found in the fact that the goats will pick up a living where cows would starve, and will, in addition, give enough milk for the family; while those owning goats near cities will derive a considerable revenue through supplying milk to invalids and children, for which purpose goats' milk is pre-eminently suitable, being more easily digested than that of cows on account of the smaller size of the fat globules.

Advantages of Goat Keeping. The ability of the goat to live where a cow would simply starve and the small comparative cost of purchasing one, furnish strong reasons why many who desire to have a supply of new milk of good quality available at their door should invest in a goat for that purpose. Goats, of course, do best if they have a pasture to roam over, but many cottagers in Great Britain keep goats who have no other means of feeding them except the limited growth of grass in parts of their gardens, with perhaps an occasional tethering on the roadside, and the refuse from their garden stuff. The milk of a couple of good goats will generally supply a fair sized household, while with three there will be an ample supply all through the year.

The goat has one important point of advantage over its rival, the cow. It is almost entirely free from tuberculosis and, consequently, there need be very little fear that the seeds of consumption could ever be conveyed to human beings who drink goats' milk. Moreover, their milk is more nutritious, and is oftentimes recommended by doctors for use by sickly and delicate children and invalids. In Great Britain as high as 1s. 6d. and 2s. a quart is paid for goat's milk for sick or weakly persons.

Stabling for Goats. While a goat can spend most of its time out of doors during fine weather, it like other animals, must have a place of shelter to which it can resort during storms, and in which it can pass the winter. Here again it has another advantage over the cow, inasmuch as a much smaller and cheaper building is required. If there is no shed available and one has to be built it need be no bigger than five feet square for a single animal. Two goats can be very comfortably accommodated in a shed 6x8 feet. When more than one goat is kept it is best to give each one its own stall. No bedding is required, provided a movable slatted shelf is laid on the flooring of the stall. There should be a rack for the hay and a small manger for the grain and other feed, or what is better a receptacle for a pail so that the latter can be removed and cleaned out. For tieing purposes a wide dog-collar and short chain or a leather halter with a chain are generally used. The chain should be short enough to prevent the goats turning round in their stalls and soiling their food, because they will always refuse to eat any food that is dirty.

Food for Goats. In summer goats will do best on pasture, but if they are allowed to roam at will in a field care must be taken to have good fences as they will otherwise jump over them. A four foot woven wire fence is sufficient to restrain them, however; but when the goats are "breachy" it is a good plan to tether them and move them twice a day. Goats dislike rain and wind, and they should, therefore, be brought in during a rain storm if it is severe. If "soiling" is practised on account of want of pasture they will do well on cut grass or leaves, the refuse of vegetables, potato and apple peelings, and any crusts of bread, provided always that these are kept sweet and clean. Fresh water should be given twice a day at least.

During the winter small quantities of hay will have to be given at each meal together with roots and linseed cake, while the goats in milk should also get half a pint of oats at a meal. Goats are rather capricious in their appetites, and some will eat greedily what others will not touch. The owner will, therefore, have to study the inclinations of his goats, and feed each according to its fancy. Three important rules must, however, be observed,—to feed often and give as great a variety as possible, and to see that the food is perfectly clean. Some feed their goats four times a day, but most not more frequently than thrice. When turnips are fed, goats seem to prefer them cut in half but not sliced. They then scoop out the fleshy part and leave the skin like a shell. When once a goat has become used to corn it prefers it to oats or any other grain, and it seems to like it in the whole state better than when crushed or soaked. Mr. Holmes-Pegler, the Secretary of the British Goat Society, prefers corn to oats for his milking stock. The grain is fed by itself and not mixed with cut feed. Goats are very fond of rock salt.

Breeds of Goats. It is only during the last twenty-five years that any steps have been taken in Europe to improve and classify the various breeds of goats. The first British show of goats was held in 1875. The British Goat Society organized in 1879 now has a herd book which contains over 700 entries. The goats found in Great Britain are a mixed breed, made up by crossing native goats with Nubian, Toggenburger and other breeds. The Nubians are distinguishable by their drooping ears, and being good milkers have been used freely on the native British goat, and many of the best goats in that country are now largely of Nubian blood. The Toggenburg breed comes from Switzerland, where milk production in goats is sought for as much as possible. They are of a mouse color, harmless, have erect ears and a light band down each side of the face and on the lower parts of the legs. Crosses of this breed have figured largely at goat shows in England. Both Nubians and Toggenburgers are short haired goats. Then there are Welsh or rather Irish goats, which are rough haired and horned and are almost worthless for milk production. From Malta comes the white Maltese goats, some of which are extraordinary milkers. In Germany five goats are kept to every hundred of the population, and they are also largely kept in Italy and Greece, in the mountainous regions where no other live stock would thrive.

In Syria and parts of France the dairymen drive their goats round to their customers houses and milk them before their doors, the customer, if he has any preference, designating which goat he wishes milked.

There has never been any standard of points drawn up for the British goat, inasmuch as a great variety of types in color, size, and as regards horns, is always to be found, the practice has been followed at exhibitions of ignoring purity of breed, the prizes being offered with a view to encourage the selection of the best milkers, irrespective of breed. In a general way the points aimed at are size ; a fine smooth coat of short glossy hair ; horns, if any, to be small as possible, dark in color, and to curve backwards ; the females to be of the same distinguishing type as cows of a dairy herd, viz., wedge-shaped and carrying large and shapely udders and teats, the udders to be soft and elastic and not fleshy, the teats to be nicely tapered, set far apart, to be from two and a-half to three and a-half inches lon

Angora Goats. Angora goats are now raised in considerable numbers in various States of the Union, the original stock having come from Asia Minor and Turkey. In some parts they have thrived exceedingly well, and as their hair, which is known in commerce as mohair, sells for three or four times the price of common wool, the raising of these goats has been quite profitable. Increased attention is being given to them in California and some of the other western States. In addition to the profit derived from their fleeces they have been found invaluable in clearing land covered with small scrub and brushes, goats having a great fancy for eating small limbs and twigs of trees. It is claimed for them that they can stand cold weather well, but it is at least doubtful whether they could be raised profitably as far north as Canada, or whether they could stand the winter successfully. In Minnesota a breeder states that he has made money raising them, and that the females breed on an average two kids a year each. For those in search of milk production, however, a goat with Nubian or Toggenburger blood in its veins would be the most desirable.

Goats' Milk. For household purposes goat's milk surpasses cows' milk, being richer, sweeter, and more nutritious. When used for pastry its richness enables the housewife to reduce the quantity of eggs that would be otherwise used, while the easiness with which it is digested is another great recommendation. The average percentage of water in goats' milk is 83-21 ; of butter fat, 7.30, and of other solids, 9,49 ; while in cows' milk the average figures are water, 87.56 ; butter fat, 3.63 ; and other solids, 8.81 per cent. Goats' milk more closely resembles human milk than cows' milk. If properly cared for no difference of flavor can be detected betweeen it and cows' milk. It is not satisfactory for butter, but does well for cheese-making, the world-wide known Roquefort cheese and other makes being composed largely of milk from goats. Goats can be milked from the side or from behind. As a general rule they are milked only twice a day. They are in their prime from about three to six years old. Good milkers will yield from three to four pints a day, although this limit is often exceeded by individuals, and as much as three quarts a day has been obtained from exceptional milkers. Goats vary, however, very much in their milk yield, and the only satisfactory method when purchasing a goat is for the buyer to see the animal milked. A convenient way when goats are milked is to make them stand on an elevated platform or bench. The operation is not so hard on the back when this is done.

In Germany experiments were conducted with sixteen Swiss goats which were milked thrice a day. The milk yield for the year ran from 421.91 to 911 litres,* with an average of 678.41 litres. The fat content of three to four year old goats averaged 3.6 per cent., and of younger

*A litre = 61.208 cubic inches ; 4½ litres = 1 imperial gallon.

animals, 2.79 per cent. for the entire period of lactation. When native goats were tested the milk yield was from 674,72 to 1,255.44 litres during the year, the average being 877.88 litres. The fat content averaged 3.07 per cent. The milk from the noon milking was nearly always richest in fat, and that taken in the morning the poorest.

Breeding and Rearing Goats. Goats generally breed during the winter or early spring. They should be bred when about eighteen months old. The period of gestation is about twenty-one weeks. As soon as conception takes place the milk yield rapidly diminishes and dries up. The usual number of kids is two, though sometimes there may be as many as three or four. If it is not desirable to raise the kids they can be allowed to suck for four or six weeks and then killed and roasted. In flavor the meat, which is tender and white, resembles lamb when it is served with mint sauce. If stuffed like a loin of veal and some bacon is cooked with it, it is also delicious. After the kids are six weeks old they lose their milk flesh and become lean and scraggy. When the kids are to be raised they can be either allowed to suck for a couple of months or (the more preferable way when the mother's milk is wanted) they can be reared on cows' milk, given in a bottle, and by degrees the whole milk can be replaced by skim-milk with linseed meal, or by one of the calf meals. The kids are easily taught to drink and soon begin to nibble at crushed oats and hay

Goat Skins as an Article of Commerce. We have no figures as to the number and value of goat skins imported into Canada, but into the United States the importations during the year ending June 30th, 1898, were of the declared value of not less than $15,776,601, or taking the average market price in New York of 39.3 cents per pound, during that year the true value was not less than $25,508,249. Nearly all the goat skins used in commerce and manufactured in the United States are imported, although it is estimated that there are in that country not less than 500,000 goats.

Even if there was no home market for goat skins in Canada it would seem advisable to raise goats for the purpose of exporting skins to our neighbors to the south of us. That market is continually growing, the increase in importation in 1898 being 28.2 per cent over that of 1897. There is the additional advantage in that the skins being admitted duty free. Besides the profit from the skins there is a further return from the flesh, tallow, bones, hoofs, horns and the offal, which would probably equal that from the skin.

Diseases of Goats. Goats are probably more free from disease than any other domestic animal. Prof. Nocard states that out of over 130,000 goats and kids slaughtered at the shambles of the La Villette, Paris, every spring, the inspectors have failed to discover a single instance of tuberculosis or lung disease, and even inoculation fails to introduce the fatal bacillus into it. The principal trouble from which goats suffer is diarrhœa, due to feeding on low wet land or exposure to damp, colds and coughs when they have been out in rain, and internal parasites when the animals range has been limited to a small plot of ground which has become foul in consequence. It will thus be seen that the goat in addition to other good points is a very healthy animal.

For much useful information as regards the goat we are indebted to Mr. Homes-Pegler, Secretary of the British Goat Society, whose "Book of the Goat" is a standard work on the subject.

HORSE BREEDING.

By Prof. J. Hugo Reed, V.S., Guelph, Ont.

Since the year 1892 until the present time the general cry among farmers has been "there is no money in horses," and consequently breeding operations were almost suspended. About that time there was a financial depression in most countries that afforded markets for our horses, and about the same time the general use of electricity as a motive power for street cars, and other purposes for which a certain class, or rather kind, of horses had been used. These two factors had a material influence upon the market for this kind of horse, and also affected to a considerable extent the market for the higher classes. But even during the time when the market was the most depressed there was not a time when a good individual of any of the recognized classes would not fetch a fair price; and in my opinion, the time is far distant, if it ever comes, when such will be the case. During the years of 1893 to 1896 inclusive nearly every farmer in the country had an overstock of unsaleable horses on his farm; horses, that while sound, or practically so, and good, useful animals for certain purposes, at the same time had no class, and nobody wanted them, even at very low figures. The consequence was, farmers came to the conclusion that the horse market was gone forever and they quit breeding and disposed of their surplus stock as best they could, some were destroyed, some given away and

others disposed of for trifles. In these, and other ways the surplus stock was got rid of. During this time, at Institute, and other meetings, the speakers, who had given considerable thought to the subject, foresaw the result, and advised farmers to keep on breeding, but to be careful and breed good horses, stating that the surplus stock was being disposed of and young ones were not being produced, that if this condition of things were to continue there would be trouble when the present stock became lessened by disease, accident and other causes. The question then would be, how are we going to get horses? The farmers would not believe us, and in many cases actually laughed at us. The present state of the horse market verifies the truth of the predictions then made. To-day horses are scarce and hard to purchase. A horse that will now sell for from $80 to $100 could four or five years ago be bought for $25 or $30, and the end is not yet. As far as I can see this condition must last for three or four years longer, as we may say only at the present time is the farmer realizing the fact that there is a scarcity, and consequently he is again turning his attention to breeding. Present conditions point clearly to the fact that horse breeding can be carried on with a reasonable prospect of fair profit. I do not mean to advise farmers to go exclusively, or even extensively, into horse breeding, but to have one or more mares breeding every year, as I think any person following mixed farming should. While to-day even the horse of no particular breeding or characteristics to particularly recommend him (the mongrel we might say) will command a fair price, I do not recommend his production. The time for the patronage of the impure bred sire at a low stud fee is past. Considerable pressure has been used upon the government endeavoring to get it to pass an act prohibiting the use in the stud of all impure or unsound sires, and forcing the owners of sires to obtain a certificate of soundness and individuality from inspectors appointed by the government, before he is allowed to so use his horse. The government has not seen fit to pass such an act, and probably it is as well so. If breeders refuse to patronize horses of this kind their owners will soon see that their chance of profit from that source is gone, and will withdraw them from the stud, and this, I think, is a better way to deal with such men than to endeavor to force retirement by an act of parliament. In order that a man may successfully and profitably breed horses a few things are essential. In the first place he must be a fair judge of a horse, he must understand the desirable conformation, action and characteristics of the horse he is trying to produce, and the greater his knowledge of the internal economy—as bones, muscles, ligaments, nervous, thoracic and abdominal organs—the better. He must, provided he intends breeding for the market, carefully study the horse markets and ascertain which classes of horses are in demand at fair prices. Then he must decide which of those classes his particular tastes or fancies, conditions and environments, warrant him in endeavoring to produce. He must fix in his mind a definite standard and then work up to that standard.

He must not expect to reach his ideal all at once, he must have patience and perseverance, must not become discouraged if he be disappointed in his first attempt. Success in breeding horses, as in all other departments of farm management, must be measured by the actual value of the products and the profits that may be derived from them. The relative value of animals depends upon their adaptation to a particular purpose, and the returns they make for expense incurred and food consumed. The man who contemplates breeding horses for profit should carefully study the "Laws of Breeding." He must recognize that reproduction is governed by certain laws. There is no such thing as chance in breeding. All occurrences that appear as such can be explained if we are acquainted with the history of the sires and dams for generations back. We will now mention a few of the principal laws of breeding, some of which the breeder can control, others he cannot.

The Law of Heredity or Similarity. The greatest and strongest law of breeding is the law of heredity or similarity, or, in other words, "like begets like." But we have deviations from this law which are often hard or impossible to explain. The law is not absolute. It is necessary for the maintenance of species. In this respect it is absolute; the law of variation is necessary for the improvement thereof. Breeds have been improved and new breeds developed by crossing. The law of heredity is so strong that it teaches us to be careful in the selection of both sires and dams for breeding purposes. It is claimed by many that the intellectual and nervous points of the offspring are imparted to a greater extent by the dam, and the external conformation and constitution more by the sire. (This is a disputed point) Not only are desirable qualities, as conformation, constitution, disposition, etc., transmitted from the parent to the offspring, but also undesirable qualities, and also diseases, or at least a tendency or hereditary predisposition to diseases, such as ophthalmia, spavin, ringbone and other bone diseases, roars, heaves, chronic cough, etc. Youatt says there is scarcely a disease but is to a certain extent hereditary. If we accept these as facts we will readily perceive the importance of exercising great care in the selection of animals for breeding purposes—both sires and dams. Don't undervalue the dam. One of the greatest mistakes often made is to breed a mare that is worthless, or nearly so, expecting her to produce a good foal. We often hear the expression, "That mare is not of much account, but she will do to breed."

If the dam be inferior it is quite unreasonable to expect the progeny to be a high class animal even though the sire be a superior one. It goes without saying that a parent cannot impart to her progeny qualities that she does not herself possess. Another mistake often made is, a man has rather an inferior mare and he does not consider he is warranted in paying the necessary fee to secure the services of a first-class stallion for her, and hence breeds her to a low-priced and inferior animal. If a mare be worth breeding at all she should be bred to the very best stallion of her class whose services can be secured for a reasonable stud fee. Even a rather inferior mare, if mated with a first-class sire, will in all probability produce a fair foal, a better animal than herself, but usually inferior to the sire. Deformities and diseases are not always transmitted to the progeny, but frequently they are affected for three or four generations by such things. When accidents happen to mares during pregnancy the offspring is liable to be affected thereby. If the law of heredity were absolute or invariable all breeding operations would be of a very monotonous character, but inferior animals or plants can be improved by careful breeding and this is called

The Law of Variation. On this law the breeder places most of his expectations in breeding. For instance, grain or corn will adapt itself gradually to whatever climate you continue to grow it in. The coarse corn of the south sown in this country will grow tall and rank, but few grains will ripen before the early frosts. Each time it is grown it becomes better and better until it becomes adapted to the climate, unless there comes a very early frost, when the whole will be destroyed. Most vegetables can be traced to some worthless little plants found on some of the hills of Great Britain or France. The various races of human beings are accounted for by the law of variation. The same law applies to domesticated animals. What was the original of each species we can form only our own opinions. As an instance, we may take the turkey, unknown in the old world until about 200 years ago, and now the varieties are numerous, and differ greatly in size, form, color, etc. All these varieties have been developed gradually by careful breeding from the wild turkey. These changes can be traced to three causes, viz., climate, supply and nature of food and habit. Climate has great influence on the constitution and organization. Animals of hot climates are very different, especially in regard to the skin and its coverings, to those of cold climates. In warm climates the covering is thin and light, while in cold, wet climates there is a fine wool next the skin and growing through that there is a coarse variety of hair to throw off the wet, etc. The great work of Nature is to protect the true skin from wet and cold which affect the internal organization.

The supply of food has a great influence on the form and habits of animals. In the low, natural pastures of England, where food is plentiful and of good quality, the stock is large, heavy and indolent, mature and fatten quickly, while on the mountains of Wales or the Highlands of Scotland the stock is the opposite, being small, lively and very hardy, capable of living on little food and thriving, and standing exposure to cold sufficient to cause the death of animals not accustomed to such usage.

The Law of Habit. The habits and characteristics of animals that have been developed by the conditions in which they are placed, or the peculiar training they have received at the hands of man, appears to be transmitted from generation to generation with nearly as much certainty and uniformity as those that characterize the original type or species from which they descended. Some of the most striking characteristics of this form of heredity are to be found in the transmission of the highly artificial peculiarities that characterize the various improved breeds of animals. The tendency to lay on fat rapidly and mature early is inherited in the best strains of Shorthorns, Devons, Herefords and other meat-producing breeds of cattle, while the ability to secrete an abundant supply of milk is, in a like manner, perpetuated in the Ayrshire, Jersey and other dairy breeds. The certainty with which these acquired qualities are transmitted constitutes one of the most valuable peculiarities of the breed. The American trotting horse furnishes a well marked illustration of the inheritance of acquired characteristics. The various breeds of dogs have peculiarities that have been developed by a long course of training, which are transmitted with a uniformity that is surprising. Young setters, pointers and retrievers that have never been in the field will often "work" with nearly as much steadiness and ability as those that have had a long experience in hunting and sporting. In such cases, however, it will be found that their ancestors, immediate or remote, have been well trained to their special method of hunting. The shepherd dog is remarkable for its sagacity and the persistence with which it carries out the will of its master, and it would be difficult, if not impossible, to train dogs of any other breed to equal them in their special duties The greyhound hunts by sight and the bloodhound by scent, and their offsprings all inherit the same peculiarities. Habits not peculiar to any particular breed of animals are often inherited, for instance, tricks taught to dogs, as sitting up, begging, etc., are sometimes performed by their puppies without their having been taught. The handwriting of members of the same family frequently show a marked resemblance. There are families in which the special use of the left hand is hereditary. It must be admitted, however, that acquired habits are not in all cases hereditary

but it would be difficult to fix a limit of their inheritance. Acquired habits and the origina traits of animals appear to be conflicting elements in their constitution, either of which may, from its intensity, predominate in hereditary transmission. Pigs have been taught to point game, play cards, and perform various tricks, but in the hereditary transmission of these characters "Nature" has had a stronger influence than culture. There seems to be reason to believe that such hereditary transmission is limited to acquired peculiarities which are simply modifications of the natural constitution of the race, and would not extend to such as may be altogether foreign to it. From a practical point of view, however, the inheritance of acquired characteristics, so far as they are of any value, is fortunately without apparent limit. Abnormal characteristics are frequently hereditary, but they are not so likely to be transmitted as acquired habits that are in harmony with the original peculiarities of the animal. It is stated on good authority that animals that have been branded in the same place for several successive generations transmit the same mark to their offspring. Dr. Brown Sequard, in experimenting with Guinea-pigs, observed that in those subjected to a peculiar operation, involving a portion of the spinal cord or sciatic nerve, a slight pinching of the skin of the face would throw the animals into a kind of epileptic convulsions. When these epileptic pigs were bred together their offspring showed the same predisposition without having been operated upon, while no such tendency showed itself in a large number of pigs bred from parents that had not been subjected to the operation

The Law of Avatism or Striking Back. Any peculiarity of an ancestor, more or less remote, whether of color, form, habits, mental traits or predisposition to disease, may make its appearance in the offspring without having been observed in the parents. Numerous cases illustrative of this law are reported, and I have no doubt many readers of this article can call to mind cases in their own experience. Mr. Dawson reports the case of a pointer bitch having given birth to a litter of seven puppies. Four were marked with blue and white, which is so unusual a color with pointers that she was thought to have played false with a grey hound, and the whole litter was condemned, but the game-keeper was allowed to save one as a curiosity. Two years later a friend of the owner saw the young dog and declared that he was the image of his old pointer bitch, Sappho, the only blue and white pointer of pure descent which he had ever seen. This led to a close enquiry, and it was proved that he was the great, great grandson of Sappho, so that he had only one-sixteenth of her blood in his veins. Goodale states that many years ago there were a few polled cattle in the Kennebec Valley, but they finally became extinct. For thirty-five years after the last of these polled cattle were killed, the cattle on the farm of Mr. Wingate all had horns, but at the end of that time a polled animal made its appearance in the herd. In the well-known case of George III of England the insanity was transmitted by atavic descent from a male ancestor eight generations back, not only the insanity but other of the well-known characteristics of the unfortunate monarch were exactly repeated. In the Shorthorn herd book may be found numerous instances of the atavic inheritance of color, and almost every breeder can furnish from his own experience instances of a similar nature. Occasionally a black lamb appears in a flock in which black sheep have not been present for several generations. In a large family we seldom find all the children resembling either parent, and in many instances the resemblance to a grandparent or some more remote ancestor prevails to so great an extent that the obvious peculiarities of the immediate parents are obscured.

The Law of Correlation. Any peculiarity in the development of one organ or set of organs is usually accompanied by a corresponding modification or suppression of the organs of some other part of the system. The correlated structure of animals enables the comparative anatomist from the examination of a tooth to determine not only the class and order to which the animal belonged, but its habits and mode of life and the character of food required for its support. It is claimed that when any particular part of the body acquires a very high degree of development certain other parts stop short of their ordinary state of evolution, as if the former obtained its unusual increment at the expense of the latter. The law of correlation is well illustrated in herbivorous mammals. A limb terminating in a hoof serves for locomotion only, it cannot be used as an organ of prehension, to grasp, seize or tear, and the teeth of these animals have flat, roughened grinding surfaces, while in carnivora the feet are supplied with nails or claws which enables the animals to use them for prehension and holding flesh, etc., while the teeth are fine and pointed and the muscles of mastication strongly developed. In blind persons the sense of touch attains a delicacy that is surprising. Cases are on record of blind persons who could not only distinguish colors but shades of the same color by the sense of touch

The Law of Fecundity or Power to Reproduce. The fertility of animals is frequently influenced by changes in their surroundings and habits that cannot of themselves be considered unfavorable to the healthy action of the system. It has been observed that the procreative powers are impaired, or even entirely wanting, in many wild species when placed in confinement. Domesticated animals are, as a rule, more prolific than the wild ; no doubt due, in a great measure to a better supply of food throughout the year, and the more uniform conditions

in which they are placed. The activity of the reproductive organs is necessarily dependent upon the functions of nutrition which supplies the material concerned in the operation. There is a certain degree of antagonism between the nutritive and the generative functions, the one being executed at the expense of the other. When the function of nutrition is impaired by disease, or when the supply of food is not sufficient for the wants of the system, the reproductive powers suffer a corresponding decrease in their activity. Sheep bred on rich pastures more frequently produce twins than those pastured on poorer lands. While full feeding seems to increase the fecundity, any excess in the nutritive activity of the system will as readily impair the powers of reproduction. It is hard to say whether underfeeding or overfeeding has the greater effect on fecundity. To be prolific an animal requires to be kept in moderate condition. There seems to be a marked relation between the size of animals and their fecundity. Throughout the entire animal kingdom the small species of animals appear to be more prolific, and, as a rule, breed at an earlier age and at shorter intervals and produce a greater number of young at a birth. It is a well known fact that members of certain families of any species are more prolific than members of other families. Among cattle it is said that when twins are produced, a male and a female, the latter, called a free martin, is, as a rule, barren ; when twins are of the same sex the reproductive powers are normal. In free martins the internal generative organs are said to be imperfect, partaking of the character of both sexes. In appearances these imperfect animals often resemble males.

In-Breeding and In-and-In-Breeding. In-breeding indicates the breeding together of distant members of the same family. In-and-in-breeding the breeding together of very near relatives. The line of distinction between the terms is very hard to define. Various opinions exist in regard to this line of breeding, many claiming that in-and-in-breeding produces a delicacy of constitution, others disclaiming this fact. My experience is that it is not well to breed too close, but that judicious in-breeding is generally successful. We can thereby intensify any desirable qualities the family may possess. Many cases of in-and-in-breeding in fowls and sheep with favorable results are reported. In wild animals, where it is carried on without restraint, we notice the species do not deteriorate, due to the fact that the best and strongest males drive the weaker ones away, hence the offspring is the produce of the best specimen of the male.

Crossbreeding. Strictly speaking crossbreeding is the pairing of animals of distinct breeds, and in this limited sense it may be considered the opposite of in-and-in-breeding. But the term crossbreeding or outbreeding is frequently used to indicate the mixture of the blood of different families of the same breed. Crossbreeding has probably been carried on more in sheep than in any other animals, frequently with good results, but often the reverse. Some animals, the mountain breeds of sheep for instance, that have been bred on the mountains for years and years, have acquired such individuality of form, constitution, etc., that the introduction of improved rams gives very poor results. Crossbreeding can have but two objects, either the improvement of existing breeds or the production of a new breed. To cross breed with the idea of obtaining a new breed requires a great deal of knowledge, patience and wealth, and can be successfully carried out by very few. To improve for the purpose of slaughter or for the improvement of other qualities is a different thing, and for these purposes judicious crossbreeding (not too violent crosses) is likely to be successful. Crossing must be done by degrees, extreme or violent crosses are not to be tolerated. In breeding horses a farmer breeds either for his own use or for the market. If for his own use he must make up his mind what class of horses is best suited to his purpose and then be careful in the selection of both sire and dam. If for the market, he naturally considers what class is in the greatest demand at the best prices, and, having decided that question, goes intelligently to work to produce it.

The Relative Influence of Parents. Many diverse opinions are given by writers as to the relative influence of parents upon the progeny, some of which, without sufficient reasons, have been quite generally accepted as established facts. My opinion is, that the condition and general constitution of animals during the time of copulation has great influence upon the progeny, and provided both sire and dam be in good health, the one of the better breeding, that is the animal that is the produce of ancestors that have been bred in a certain line for generations, and has the characteristics of that special family intensified in him or her, which consequently gives him or her greater prepotency, will have the greater influence upon the offspring. The importance of securing males of the best quality—males that from their superior breeding will be likely to be prepotent—to mate with the mares at our disposal cannot be too strongly urged as one of the readiest means of improvement. It is generally admitted that the more pure or less mixed the breed is, the greater the probability of its transmitting to the offspring the qualities it possesses, whether these be good or bad. Economy has made the male in general the most important, simply because he sires a great many foals while the mare produces but one each year.

Influence of a Previous Impregnation. The influence of the male in the process of procreation is not limited to his immediate offspring, but extends through the female that he

has impregnated to her offspring by another male. Paradoxical as this statement may appear, there are many well authenticated cases on record that cannot be explained in any other way. It is authentically stated that in 1815 a chestnut mare, seven-eighths Arabian, was covered by a Quagga (a species of Zebra). The hybrid produced resembled the sire in color and many characteristics of form, etc. In 1817, 1818 and 1821 the same mare was bred to a pure-bred Arabian stallion and produced three foals, all of which bore the curious markings of the Quagga. Instances of this kind in a less marked degree have been noticed by many breeders. Although any impregnation may have influence upon successive ones, the first is of the most importance. It is probable that the female has received, through the fœtal circulation, some of the attributes the fœtus has derived from the male, and that these are communicated along with those proper to herself to the offspring of a different male. It is claimed that when a pure-bred female of any breed has been impregnated by a male of another breed she becomes a cross—loses her purity of blood in consequence of her connection with the foreign animal. It may be said that the act of fecundation is not an act that is limited in its effect, but that it affects the whole system, the sexual organs especially, and in the sexual system the ovums to be impregnated hereafter are so modified by the first act that later impregnations do not efface the first impressions.

Intra-uterine Influence. The abnormal peculiarities sometimes observed in animals at the time of birth, that are not recognized as family characteristics, have been popularly attributed to some mysterious influences of the imagination of the mother in the process of intra-uterine development. Some claim that this law is noticed even in fowls. It is stated that the ambition, courage and military skill of Napoleon Bonaparte had their foundation in the fact that the Emperor's mother followed her husband in his compaigns and was subjected to all the dangers of a military life, while on the other hand the murder of David Rizzio in the presence of Queen Mary was the deathblow to the personal courage of James I., and occasioned that strong dislike of edged weapons for which that monarch was said to be remarkable. Various instances can be cited of deformities, monstrosities and birth marks in the human family traceable to frights, etc., received by the mother during pregnancy. The same law acts, but not to so marked an extent in the lower animals. I call to mind one well-marked case of the effect of a fright received by a mare during the act of copulation. A farmer bred a half-bred Clydesdale mare to a pure bred Clydesdale stallion. Both sire and dam were good individuals with full manes and tails. This farmer owned a dog with a very short tail, and he had the habit of interfering with any of the stock that were fighting. The stallion came to the farm to serve the mare, and during the act of copulation the dog, evidently thinking his services as a peace-maker were in demand, caught the stallion by the tail and growled and swung from side to side. The groom ran back and gave the dog a kick and he ran towards the barn, passing directly in front of the mare. This mare produced to this cover, and the foal, while perfect in form, had only a few hairs and no dock where the tail should be. This animal is still owned by the breeder. I saw her a few months ago and she is a fair representative of her class, being well developed in all points except the above. I cannot explain this phenomena in any way except that the mare was startled by the sudden appearance of the tailless dog, and it caused such a nervous impression as to cause the development of a fœtus with the same peculiarity.

Sex at Will. Various theories have been advanced in order to produce sex at will, but as far as I can learn all have failed in actual practice.

If we recognize the foregoing laws as governing factors in the reproduction of horses it teaches us that too great care cannot be exercised in the selection of animals for breeding purposes, and also that great care of the dam during pregnancy is demanded. As to the hygiene of pregnant mares, it does not differ in many respects from that of other animals. The mare should be kept in moderate condition and be given regular exercise during pregnancy, or else regularly used at ordinary work. She should not be subjected to excessive muscular exertion, and should not be worked much under saddle, and, if ridden at all, spurs should not be used, as the excessive muscular contraction often caused by the application of the spur is liable to cause abortion. If we are breeding with the hopes of producing speed I think it well to speed the mare for short distances at whatever gait we expect to produce, as I think the offspring inherits to a certain extent the habits of the dam, especially those exercised during the period of gestation, but she should on no account be speeded for sufficient distances to produce fatigue. The food and water should be of the very best quality, the food easily digested and given in reasonable quantities. The premises in which she is kept during cold weather should be roomy, thoroughly clean and well ventilated. All undue nervous excitement should be avoided, also the access of all nauseous odors, and all operations that necessitate the casting of the animal or the drawing of blood. The administration of drastic purgatives should also be avoided if possible, as all of these have a tendency to produce abortion. When the time of parturition approaches she should be carefully watched and, if necessary, skilled assistance called in. As before mentioned the prospective breeder should carefully consider the class of animal he will endeavor to produce,

and, having decided that point, he should provide himself with one or more mares of that class, of the best quality his means will allow. Unless he can provide a mare or mares of at least fair quality he had better not breed at all, as the results will surely be disappointing from the reasons already stated. I do not consider it necessary to secure pure-bred mares, of course it will be all the better if such can be got, but the price of good pure-breds of any class is beyond the means of the ordinary breeder. Having secured the dams for our prospective stock, the next point is to select a sire. Unfortunately there are many owners of stallions who think it is the duty of their friends to patronize them. This is altogether a mistake. The breeding of horses, is a business matter, and must be considered purely from a business standpoint in order to make it a success, and the man who breeds his mare to an unsuitable stallion, simply because he is owned by a friend, not only is doing himself an injustice, but his friend an injury. The result will, with very few exceptions, be the production of a nondescript, and as a stallion's value in a community is determined largely by the quality of his stock, the production of a colt of this kind will injure his reputation to a much greater extent than can be compensated by the stud fee received. A breeder must carefully study his mare in regard to conformation, temper and general peculiarities, and remembering the law that "like begets like," select a sire that should be suitable. If the mare be deficient in some particular point select a stallion that is well developed in that point; if she have hyper-development of any point see, if possible, that the sire is rather deficient there. If she be of hyper-nervous disposition, select a phlegmonous sire and vice versa. In all cases be careful to ascertain that both parents are not affected with any disease the predisposition to which will probably be transmitted to the progeny. Diseases or malformations that can be traced directly to injuries of course are not transmissible. Undesirable traits of disposition, as viciousness stubbornness, etc., are as much to be avoided in breeding animals as disease. The classes of horses that at the present time are in demand at fair prices are: Heavy draft, carriage, saddle horses and hunters, and good, strong, clever roadsters. Other classes that cannot be produced by any special line of breeding are good chunks of 1,300 to 1,400 lbs. and cobs with extreme action.

In selecting stallions to sire any of these classes out of the mares at our disposal we should insist upon both individuality and pedigree. The time when pedigree alone was considered is fortunately past. A horse with a good pedigree but poor individuality, a poor or inferior animal of his class, is of course not a suitable animal for a sire. Get both if we can, but I would sooner sacrifice pedigree than individuality. In mentioning the classes of horses that the farmer can produce I have purposely omitted race horses. I do not consider it is the province of the ordinary farmer to try to produce horses to race at any gait. The percentage of horses produced that are fast enough to win money at any gait on the race track is very low, and if a farmer of ordinary means should produce one it will cost him a great deal to develop his speed. My observation has been that the farmer who has attempted this has generally ruined himself financially unless he has sense enough to see how things were going and given it up before he has spent his all in trying to produce a world beater. Therefore, I say, leave the production of race horses in the hands of the millionaire, and endeavor to produce an animal that has a fair value at four or five years old without much development or handling. Let the dealer educate the horse for the city market. Of course this applies to the lighter classes of horses that require a considerable amount of education to fetch the fancy prices occasionally paid. If the farmer has time and experience in such matters it will probably pay him to put the finished article on the market; but as a rule it pays him to sell the young horse in the green state to the dealer for a reasonable price and let him take the trouble and chances of giving him manners and action and selling him for a fancy price, provided, of course, he develops into a superior animal. The light classes of horses, as carriage horses, cobs, saddlers and hunters require good manners and willingness and ability to perform cleverly the functions peculiar to the class before they can be put upon the market as a finished product. The education of such horses is, we may say, a business by itself, and the farmer who attempts it, even though he may be very capable and competent, must of necessity neglect his general farm operations, therefore we contend that he should, as a rule, sell his horses partially green. Of course it pays to have the horse tolerably handy in harness or saddle in order to be able to show the prospective purchaser that he is capable of developing, with proper handling, into a good specimen of his class. It is a mistake to let a colt remain entirely unhandled until four or five years old and then offer him for sale in that condition. The average dealer will not buy a perfectly green one, as it is generally a hard and dangerous task to handle a big four or five year old colt that has never been accustomed to restraint of any kind, and a horse that will drive in single or double harness or carry a man on his back, what we might call a partially educated fellow, is worth a great deal more money than the same animal perfectly green. Draft horses, weighing from 1,400 to 1,700 lbs., are produced by breeding good mares of this class to a sire of any of the recognized breeds of draft horses, but especially to the Clydesdale or Shire. Percherons and Suffolk Punches have not proved profitable sires in this country, but the two former classes have proved very successful, and they are so much alike it is not necessary to go minutely into the distinguishing characteristics. The

Clydesdale is probably the most popular and certainly the most plentiful, but it is rather hard to say why it is so. Many claim that the draft colt can be reared with much less risk and with less liability to accident and disease than the lighter classes. This can probably be explained from the fact that the colt of this breeding is naturally a quieter and more settled animal than those of lighter breeds and hotter blood, and consequently less liable to injure himself from exuberance of spirit while in the pasture field or paddock. And then again, small bunches, or blemishes, are not considered of as much consequence, nor can they be as easily seen, especially on the limbs, on account of the amount of coarse hair, on a heavy colt as on a light animal. If we decide to breed heavy horses we should decide what particular breed we will produce, and then stick to that breed. If disappointed in the first production, do not get discouraged and try another breed ; probably it would be well to try another sire of the same breed, as there may be some reason why the first sire did not nick well with our mare ; but stick to the original selection of breeds, and if we use ordinary intelligence success is bound to attend us.

In the selection of a sire for any class of horses it is well, if possible, to drive around in the section in which he has stood in previous years and view his stock. It is sometimes the case that a stallion whose appearance and pedigree lead us to the conclusion that he should be a good sire is disappointing, and on the other hand an animal apparently not so good will prove valuable in the stud. In viewing the product of a stallion we must, of course, note carefully the mares out of which the colts have been produced.

Carriage Horses. Carriage horses, as a rule, are not pure-breds. We have in this class pure-bred Hackneys, Cleveland Bays and French and German coach horses, which are pure-bred, but as there are few pure-bred mares of any of these classes in this country, the farmer who attempts to produce carriage horses must use as sires the above mentioned sires or the standard-bred or thoroughbred. The selection of a sire for carriage horses must be largely governed by the mare to whom he is to be bred. In my opinion the Hackney is the only horse that truly comes up to the standard at present demanded in this class of horses. He has fair size, beauty, a fair amount of quality and the extreme action both fore and aft that is required. The carriage horse of the present day must have free, easy, high and attractive action of both knees and hocks ; he must be of fair size and quality with attractive appearance, both when standing and in motion. His action must not only be high but in a straight line, neither paddling nor rooling his fore feet ; he must not go wide behind, nor yet so close as to interfere. While we try to get symmetry, quality and style along with the required action, we must have action even though we sacrifice some of the other qualities. I have stated that in my opinion the Hackney is the true carriage horse, and we would therefore think that he should be used in all cases to sire such. But a great deal depends upon the mare. My experience has been that the produce of the Hackney out of a cold-blooded mare is not a satisfactory animal for any purpose ; he will in most cases be coarse, lack quality and ambition, and while he may be possessed of a fair amount of action, his very noticeable lack of other desirable characteristics and ambition render him almost worthless for the purpose for which he is intended. Therefore unless the mare has considerable hot blood (by hot blood I mean the blood of a thoroughbred), it will not be wise to mate her with the Hackney. If we have a half-bred or even a quarter-bred mare of the desirable size, she should produce well if crossed with the Hackney. The dam in this case will, in all probability, impart quality, and the sire action and style, to the offspring. Other sires for the production of carriage horses are coach stallions. The same remarks as to quality in the mare apply here as to the Hackney. These stallions are likely to produce larger stock, and many of them have very good action, and when large carriage horses are desired they should have the preference. Many first class horses of this class have been sired by the standard-bred stallion, and in fact many prize-winning carriage horses are standard-bred. At the same time I do not think it wise to breed standard-breds with the hopes of producing carriage horses. Horses of this class have been bred for many generations with the sole idea of producing extreme speed at the trotting or pacing gait, and as a rule they lack the conformation and style demanded in the carriage horse, and seldom have the desired action, and while we occasionally find one that fills the bill, it is the rare exception. And we do not wonder at this, as he has not been produced with this idea. At the same time there are many big, clever, stylish, high-actioned standard-bred stallions in the country that are well qualified to produce carriage stock if intelligently mated. The mares to be bred to these stallions with this idea must be of fair size and quality with the characteristics of a carriage horse well marked. If we are breeding to the standard-bred with the hopes of producing speed, we will, of course, select a stallion that can trot or pace fast, not paying so much attention to size, quality, etc. But if breeding for carriage purposes speed is not at all an essential. One danger in this line of breeding is the fact that standard-breds, even though true, natural trotters, are liable to produce pacers, and of course this is a gait that cannot be allowed in a carriage horse. Many good carriage horses have been sired by the thoroughbred. We can breed a coarse mare with good action to this horse with greater prospects of success than to any other sire. He will impart to the progeny the necessary

quality and ambition and the dam will impart the necessary action ; but in order that we may get the desired action for carriage purposes in this line of breeding, we must have the action in the dam. As the action of the thoroughbred, while very elastic, is naturally rather close to the ground, and, as he has such great prepotency, it requires extreme action in the dam to overcome this characteristic.

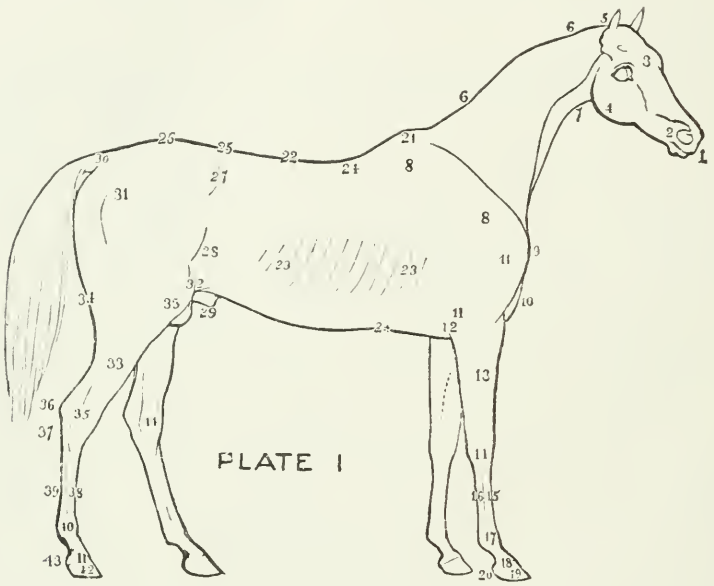
Saddle Horses and Hunters. Suitable horses of this class are, with few exceptions, the progeny of the thoroughbred. I might here make a few remarks about the term "thoroughbred." There is but one animal in the world that is entitled to the term, and that is the English running horse and his pure descendants. The term is often misapplied, both in print and conversation. We read of thoroughbred cattle, thoroughbred sheep, pigs, fowls, dogs, etc., etc. It should not be ; we should use the term "pure-bred." We have pure-bred cattle, pure-bred sheep, etc., etc., and in horses we have pure-bred Clydesdales, pure-bred Shires, standard-bred horses, etc., but the term "thoroughbred" needs no qualifications whatever. It applies to the one animal and to him alone.

The thoroughbred, we may say, without danger of successful contradiction, is the purest domesticated animal produced. He has been carefully bred in certain lines for centuries and careful records have been kept. Doubtless he originated by intelligent crossing ; but crossing ceased so long ago that he may truly be called thoroughbred. On account of his careful breeding and strong individuality he has greater prepotency than any other sire. (By prepotency we mean the power, or ability to transmit to his progeny his own characteristics). On this account we need to be even more careful in selecting a sire from this class than from others—as if there be any undesirable points or characteristics, whether of conformation or disposition in the sire they are liable to be even more marked in the progeny. Therefore we must not breed to a thoroughbred simply because he is thoroughbred, but be careful to select a sire that is of the required size, sound, of good conformation and disposition. We can, as already stated, breed a coarser mare to this horse than to others. His progeny, except from very coarse mares, seldom lacks quality and ambition. Of course even with this sire the cross must not be too violent. Violent or too well marked crosses in any case are seldom followed by satisfactory results. The produce of the thoroughbred generally excels in the saddle and makes a fair harness horse. He is the best all round horse. The market for the good sized half-breed is, always has been, and I think it probable always will be, good. He, with the carriage horse, is the rich man's horse, and when we are able to supply the animal men of this class want price will not prevent his sale. It is not a hard matter to produce small animals of this class, called light weights and medium weights, but the production of a heavy weight hunter, one able to carry up to 220 lbs. or over, is a more difficult matter. For this purpose we should select a large mare 1,200 lbs. or over with as much quality and ambition as possible, and breed her to a good big thoroughbred, one of 1,200 or 1 300 lbs. If we have a mare of reasonable quality to cross with a stallion of this description the results will in most cases be satisfactory. While there is a good market for the light weight saddler or hunter of good action and manners, a much longer price can be obtained for the big fellow of the same class. We may say that the larger the animal of this class is, provided, of course, that he has quality, the more money he is worth. There are many large men who enjoy an hour or two in the saddle, either on the flat or in the hunting field, and especially for the latter purpose it requires a large, strong horse to carry a man of say 220 lbs. or over safely across country, and when a man of this weight, with money and hunting proclivities sees a horse that has the necessary weight, ambition and manners to perform well under such circumstances he will pay a long price to secure him. Then again this horse can be also used in the carriage with a fair amount of satisfaction. Of course a first class saddler or hunter has not carriage action, but for the man who likes both riding and driving this is certainly the best horse. A horse with typical carriage action does not answer nearly as well for saddle purposes as a saddle horse does for harness.

Cobs. A saleable cob is a little chunky fellow with extreme action and beauty. He cannot be produced with any degree of certainty. He is sired by the various classes of light horses out of ordinary mares. His production in most cases can be explained by the action of some of the aforementioned laws of breeding. While a good animal of this class sells for a good price I do not think it would be well for any breeder to try to produce him.

Roadsters. A good and saleable gentleman's roadster is not necessarily a racehorse. In fact it is seldom that a racehorse makes a satisfactory roadster. A gentleman's roadster should be of fair size, 15½ to 16 hands, of good and graceful conformation, good color, and a stylish looking fellow, free driver, capable of travelling at the rate of twelve miles an hour or faster and keeping that clip up for several hours. He must have good action both fore and aft. Must not require boots or scalpers to prevent him injuring himself, and may either trot or pace. He is, with rare exceptions, sired by the standard-bred, but can be sired out of a road mare by any of the lighter breeds of sires. In order to produce him with any degree of certainty we require

a good sized mare with trotting blood and good individuality to mate with the big, clever-looking, trotting-bred stallion, with good action and at least a fair amount of speed. Small animals of this class may be able to go the distance on a good road hitched to a light rig at the required speed, but my idea of a gentleman's roadster is an animal that has sufficient size and strength, combined with speed, to enable him to draw two in a buggy over heavy roads. Unfortunately there are too many roadster-bred horses in the country that are so small that even though they may be tolerably speedy, if not fast enough for racing purposes, have really no market value. Therefore in breeding roadsters for the market we should be careful to produce animals of fair size as well as speed. Such animals can be produced if we are careful in the selection of the parents. Any of the lighter breeds of horses mentioned are very serviceable on the ordinary farm, and can be made earn their own living from three years old until marketable, say at four or five years.



Points of the Horse.

Head.

1. Muzzle.
2. Nostril.
3. Forehead.
4. Jaw.
5. Poll.

Neck.

6, 6. Crest.
7. Thropple or windpipe.

Fore quarter.

8, 8. Shoulder blade.
9. Point of shoulder.
10. Bosom or breast.
11, 11. True arm.
12. Elbow.
13. Forearm (arm).
14. Knee.
15. Cannon-bone.
16. Back sinew.
17. Fetlock or pastern joint.
18. Coronet.
19. Hoof or foot.
20. Heel.

Body or Middlepiece

21. Withers.
22. Back.
23, 23. Ribs (forming together the barrel or chest).
24. The circumference of the chest at this point called the girth.
25. The loins.
26. The croup.
27. The hip.
28. The flank.
29. The sheath.
30. The root of the dock or tail.

The hind quarter.

31. The hip-joint, whirlbone or round.
32. The stifle joint.
33, 33. Lower thigh or gaskin.
34. The quarters, haunch or upper thigh
35. The hock.
36. The point of the hock.
37. The curb place.
38. The cannon-bone.
39. The back sinew.
40. Pastern or fetlock joint.
41. Coronet.
42. Foot or hoof.
43. Heel.
44. Spavin-place.

The External Conformation of the Horse.

We will now give tables of what we consider the desirable points in the different classes of horses, making use of as few words as possible, in order to make our meaning clear. The plate and table on the foregoing page explains the position of the different points.

Conformation of the Heavy Draft Stallion.

Head. Ear somewhat short, but pointed; forehead broad and rather flat; nasal bone straight; eye full, prominent and mild; muzzle small; muscle of cheek well developed; lips firm; mouth of medium size.

Neck. Of medium length, deep where it joins the body, being continuous with withers without any line of demarcation; crest well arched, broad and strong, but not so heavy as to turn to either side; whole neck well and prominently muscled, and surmounted by a good full mane.

Withers. In line with posterior part of the upper border of neck; rather broad and well muscled; back straight, not too long; loins broad and well muscled.

Croup. Well and prominently muscled, not too drooping; tail well carried and full haired.

Chest. Ribs long and well sprung; breast broad, full and prominently muscled.

Shoulder. Moderately upright and well muscled, the muscles covering the blade thoroughly developed.

Elbow. Strong and muscular, turning neither in nor out, but fitting closely to the chest.

Forearm. Large and well covered with prominent muscles.

Knee. Well developed, broad from side to side and deep from before backwards; straight, neither bending forwards (called kneespring) nor backwards (called calf knee).

Knee to foot. Cannon bone, broad and flat with an absence of beefiness; in Clydesdales and Shires, should be well feathered with straight and not too coarse hair on the posterior border, especially in the region of the fetlock; in other breeds of draft horses the same amount of long hair is not present; back tendons hard and prominent and not too much tied in below knee; pasterns short, strong and tolerably upright.

Foot. Of medium size, rather round, with good strong wall, not flat; heels full and round and not too deep; frog well developed; must not turn toes either in or out; must stand straight.

Haunch. Heavily muscled; thick through ham; hind quarters broad and well muscled.

Stifle. Strong and well muscled.

Gaskin. Muscles strong and prominent; bone large and substantial.

Hock. Large and strong and well developed in all directions; point well developed, posterior border straight, and the joint free from puffiness.

Hock to Foot. Cannon bone and feathering same as the fore, tendons well marked and must not have a pinched or tied-in appearance below joint, skin lying close to bone and tendons; an absence of beefiness; pasterns short, strong and tolerably upright.

Foot. Smaller, narrower and more concave sole than in front foot; frog well developed.

Color. Bay, chestnut, black, brown, roan, with reasonable modifications.

Skin. Soft, mellow, loose, not like parchment.

Temperament. Energetic, docile, not nervous.

Style and Action. General appearance attractive, movement firm, smart and elastic, especially the walk.

Weight. 1,600 pounds upwards.

Height. 16 to 17 hands.

Conformation of Draft Mare or Gelding.

Head. Not so masculine looking as the stallion, ear rather short but pointed, forehead broad, nasal bones straight, eye prominent and mild, muscles of cheek well developed, lips firm, mouth of medium size.

Neck. Of medium length, deep where it joins the body, well muscled; crest high and hard, but not as much developed as in the stallion; good mane.

Withers. In line with superior border of neck, thick and strong, back short and straight; loins broad.

Croup. Well muscled, not too drooping; tail well carried and full haired.

Chest. Ribs long and well sprung; barrel tolerably round and close to the ground; breast broad, full and well and prominently muscled.

Shoulder. Moderately upright; well covered with well developed, hard muscles, the part against which the collar presses well defined, muscles covering the blade well developed.

Elbow. Well developed and fitting close to body.

Forearm. Large and well muscled.

Knee. Large and strong in every direction, straight.

Knee to Foot. Not too much tied in below knee; cannon bone flat and clean; tendons well marked and strong, may be well feathered, an absence of beefiness; pasterns short, strong and tolerably upright.

Foot. Strong, tolerably round, sole not flat, frog prominent and full, heels full and round and not too deep.

Haunch. Well muscled, thick through ham, quarters broad and strong.

Stifle. Large and well developed.

Gaskin. Muscles strong and bone substantial.

Hock. Strong and well developed in all directions, point well developed, posterior border straight, free from puffiness.

Hock to Foot. Hind cannon broad and flat, not tied in below joint, tendons well developed, an absence of beefiness, skin lying close to bone and tendon, may be well feathered by straight and rather fine hair, pasterns short, strong and tolerably upright.

Foot. Smaller and narrower with more concave sole than in front, frog prominent and well developed.

Color. Bay, black, brown, chestnut, roan, with reasonable modifications.

Skin. Soft, mellow, loose, not like parchment.

Temperament. Docile but energetic, not nervous.

Style and Action. General appearance attractive, action free, firm and easy, all feet being brought forward in a straight line and firmly planted Walking action especially must be good, not slow or clumsy.

Weight. 1,500 pounds upwards.

Height. 15¾ to 17 hands.

Conformation of Coach Stallion.

Head. Ear of medium size, fine and approaching each other at tips when pointed forewards, forehead broad and flat, bones of nose straight in front and slightly dished on the lateral surfaces, muscles of cheek well developed, eye prominent, nostrils large and flexible, mouth of medium depth.

Neck. Rather long, head gracefully attached and carried well up, crest well developed and nicely arched.

Withers. Well developed, not too thick, back straight and rather short, loins broad and strong.

Croup. Only moderately sloping, dock coming out high up, tail full haired and carried straight and well out from the body.

Chest. Ribs long and well sprung, deep from above downwards; breast full and well muscled.

Shoulder. Rather oblique and well muscled.

Elbow. Well developed and fitting closely to ribs.

Forearm. Strong, muscles well developed and standing out boldly.

Knee. Broad from side to side in front, deep from before backwards, upright.

Knee to Foot. Cannon bone broad and flat, tendons well developed and prominent, skin lying close to bone and tendons ; an absence of beefiness, not too much tied in below knee, an absence of long hair ; pasterns strong, of medium length and obliquity ; all joints strong and well developed.

Foot. Wall moderately deep and strong, of medium size and tolerably round, sole concave, frog well developed, heels broad and strong and not too deep ; must not turn toes either in or out.

Haunch. Muscles well developed and standing out boldly, hind quarters broad and strong.

Stifle. Well developed and strong.

Gaskin. Strong and well developed, muscles standing out boldly and well defined.

Hock. Large and strong in all directions, point well developed, posterior border straight ; an absence of coarseness and puffiness.

Hock to Foot. Hind cannons clean, broader and flatter than the fore ones, tendons standing boldly out and well defined, an absence from beefiness, skin lying close to bone and tendon ; must not have a tied in or pinched appearance below hock, an absence of long hair, pasterns strong, of medium length and obliquity.

Foot. Smaller and narrower, with more concavity in sole than the fore one, frog well developed, heels round and strong and not too deep.

Color. Bay, brown, black, chestnut, roan, grey, with reasonable modifications. (In this class a good horse may be a bad color.)

Skin. Soft, mellow, loose, not like parchment.

Temperament. Energetic, docile, not sluggish, free from nervousness.

Style and Action. Free and elastic, attractive, knee well bent, fore feet lifted well off ground when in motion and being brought straight forward, neither paddling or rooling, stride long, with an absence of the tarrying action sometimes seen, hocks well bent and hind feet lifted well up, not going wide or yet close enough to strike opposite ankle.

Weight. 1,100 to 1,400 lbs.

Height. $15\frac{3}{4}$ to $16\frac{3}{4}$ hand.

Conformation of Carriage Mare or Gelding.

Head. The same general outline as the coach stallion with an absence of the masculine appearance.

Neck. Clean cut, an absence of masculine appearance, rather long, head nicely attached and carried well up, crest well developed and wiry, and nicely arched, wind pipe standing in relief from the muscles, the jugular gutter well defined.

Withers. More prominent and not so thick as the stallion ; back straight and rather short, loins broad and strong.

Croup. Not too sloping, dock coming out well up, tail well haired, carried straight and well out from the body.

Chest. Ribs long and well sprung, deep from above downwards.

Shoulders. Moderately sloping, well muscled over shoulder blade.

Elbow. Well developed and lying close to chest.

Forearm. Strong, muscles well developed, well defined and standing boldly out.

Knee. Large and strong in all directions, upright ; should be critically examined for malformations.

Knee to Foot. Cannon bone strong, broad and flat, tendons well defined and standing boldly out, and not apparently too much tied in below knee, an absence of beefiness and long hair, skin lying close to bone and tendon, pastern strong, of medium length and obliquity.

Foot. Of medium size and tolerably round, horn thick, strong and with smooth surface, sole rather concave, frog full and well developed, heels broad and strong and not too high, must not turn toes either in or out.

Haunch. Muscles strong and standing boldly out, well defined, hind quarters broad and strong.

Stifle. Strong and well muscled.

Gaskin. Strong, muscles well defined, large and standing boldly out.

Hock. Strong and well developed in all directions, an absence of coarseness and puffiness, point of hock well developed and posterior border straight.

Hock to Foot. Hind cannons, broad, strong and clean, tendons strong, well defined and standing boldly out, not tied in below joint, an absence of beefiness, skin lying close to bone and tendon, limb flatter than the front one; pasterns strong of medium length and obliquity.

Foot. Smaller and narrower than in front, sole more concave, frog large and strong, heels strong and not too deep.

Color. Bay, brown, black, chestnut, roan, grey, with reasonable modifications. (A good horse of this class may be a bad color.)

Skin. Soft, mellow, not like parchment.

Temperament. Docile, lively, energetic, not sluggish, free from nervousness.

Style and Action. General appearance attractive and stylish, knees well bent and fore feet lifted high from the ground when in motion, being brought forward in a straight line with neither a paddling nor rooling motion, and not allowing the foot to tarry in the air but extending it promptly and boldly forward with a long stride, hocks well bent and hind feet lifted gracefully and quickly from the ground, not going wide nor yet close enough to interfere; must not forge.

Weight. 1,000 to 1,300 lbs.

Height. 15½ to 16½ hands.

CONFORMATION OF THE HACKNEY STALLION.

Head. Of medium size, slightly dished laterally, wide between the eyes, eyes full, prominent and mild, but lively in appearance, ears small, fine, turned inwards at tips when pointed forward, set wide apart, nostrils of medium size but very flexible, mouth small, muzzle fine, jaws not heavy but wide apart, cheeks flat with well developed muscles, but not too fleshy, head carried fairly high, nose drawn slightly inwards towards breast.

Neck. Of medium length, crest well developed, hard and whipcordy, well arched, clean, but not too fine at throat, wide and muscular at shoulder.

Withers. High but not sharp, back short with rise at loin, which should be broad, full and muscular.

Croup. Slightly drooping, long, not steep, tail set on rather high, well haired and carried straight and well out from body.

Chest. Ribs long and well sprung.

Breast. Tolerably wide and well muscled.

Shoulder. Oblique, deep and well muscled.

Elbow. Well muscled and strong, fitting close to chest.

Forearm. Long, well and prominently muscled.

Knee. Broad and deep in all directions, straight, with an absence of malformations.

Knee to Foot. Cannon bone, short, strong and flat, with an absence of beefiness, back tendons standing out prominently, no coarse hair on posterior border, tendons not too much tied in below knee, pasterns strong and of medium length and obliquity.

Foot. Of medium size, round and strong, tolerably concave sole, well developed frog, strong and broad heels, not too high, must not turn toes either in or out.

Haunch. Heavily muscled, thick through ham, hindquarters broad and strong.

Stifle. Strong and well muscled.

Gaskin. Well and prominently muscled and strong, ham string standing boldly out and well let down at hock.

Hock. Strong, clean, rather short, an absence of coarseness, well developed in all points, no puffiness, point well marked, posterior border straight.

Hock to Foot. Cannon rather short, strong and flat, an absence of beefiness, back tendons standing out prominently and not tied in below joint, skin lying closely to bone and tendon, without long hairs on posterior border, pastern strong, of medium length and rather oblique.

Foot Smaller than forefoot, sole more concave, frog well developed, heels broad, strong and not too high.

Skin. Soft, mellow, loose, not like parchment.

Color. Bay, brown, black, chestnut, roan, grey, with reasonable modifications. (A good horse of this class may be an undesirable color).

Action. Knee and hock action high, with considerable extension, stride, grace and speed, must not paddle or rool forefeet nor allow them to tarry in the air, but fetch them up and forward in a straight line, with grace, promptness and style; hind feet must be lifted promptly and high, not with a sprawling action nor yet going close enough to interfere, but being brought forward in a straight line, with a good long stride and firmly planted.

Temperament. Docile but very energetic, free from nervousness, general appearance attractive and symmetrical.

Weight. 950 to 1,200 lbs.

Height. 15 to 16 hands.

The conformation of the Hackney mare or gelding the same as above, with the absence of the masculine appearance of head, crest and general physiognomy.

Conformation of the Standard Bred Stallion.

Head. Ear of medium size and pointed, eye large, prominent and of docile expression, bones of the nose straight in front and slightly dished laterally, bones of cranium nicely rounded, nostrils firm, large and readily dilated, muscles of cheek well developed, but not too heavy, mouth of medium size, lips firm, muzzle fine and tapering, branches of lower jaw well spread apart at their angles.

Neck. Rangy with well developed crest and attached to the head in an angular sort of way, rather of the obtuse order.

Withers. May be continuous with the superior border of the neck, well developed and not too broad, back straight and rather short, loins broad.

Croup. Somewhat sloping with dock coming out high up, tail well haired and carried in a graceful manner.

Chest. Deep through the girth, ribs long and well sprung with well marked angles, breast broad and well muscled.

Shoulder. Oblique from above downwards and forwards, blade bone well covered with muscles.

Elbow. Well muscled and lying close to chest.

Forearm. Well developed and strong, with muscles well defined and standing boldly out.

Knee. Straight, strong in all directions, free from malformations.

Knee to Foot. Cannon bone rather short, broad, flat and clean, not feathered, tendons well defined and prominent, skin lying close to bone and tendon, tendons not too much tied in below knee, an absence of beefiness, pasterns strong, of medium length and obliquity.

Foot. Of medium size, rather round with strong wall, sole rather concave, frog large and well developed, heels broad, strong and not too deep, must not toe either in or out.

Haunch. Muscles well developed, deep through ham, quarters broad and strong.

Stifle. Strong and well muscled, compact.

Gaskin. Muscles prominent and hard, hamstring prominent.

Hock. Large and strong in all directions, all parts well developed, an absence of malformations and puffiness, point well developed and posterior border straight.

Hock to Foot. Cannon bone rather short, broader and flatter than in front, little or no feathering, an absence of beefiness, tendons standing out prominently and well defined and not tied in below joint, skin lying close to bone and tendon, fetlock joint large and strong, pasterns strong, of medium length and obliquity.

Foot. Smaller and not so round as in front, sole more concave, frog well developed, heels strong and not too deep.

Color. Bay, brown, black, chestnut, roan, grey, with reasonable modifications.

Skin. Soft, mellow, loose, not like parchment.

Temperament. Docile, kind, prompt, energetic, not nervous.

Style and Action. Free and elastic, perfect in trotting gait, a good walker, must not paddle or rool in front, may go wide behind, may either trot or pace, and must go level without hitting himself any place and be able to go fast.

Weight. 950 to 1,200 lbs. or even more.

Height. 15 to 16½ hands.

The mare and gelding of this class may be of the same general type as the stallion, but not so masculine looking ; the neck, withers and general physiognomy being the points which contribute most to the more effeminate appearance of these animals. The neck should be more delicate and cleaner cut, the crest not so well developed, the withers more pronounced, not so thick through and through at the upper part, and there should be line of a demarcation between withers and neck, the general physiognomy milder and more gentle and less impetuous.

Conformation of the Thoroughbred Stallion.

Head. Ears fine, not too long, approaching each other at the tips when thrown forward ; cranium broad and nicely rounded, forehead flat and broad ; eyes wide apart, prominent, large and bold in expression, nasal bones straight in front but slightly dished on lateral surfaces ; nostrils firm, large and flexible, of large capacity when the animal is excited, lips firm, mouth of medium size, muzzle small and tapering, cheeks well but not too heavily clothed with hard, well developed muscles, branches of lower jaw well spread apart at their angles.

Neck. Clean cut and rangy, crest well developed and whipcordy but not so heavy as in other classes, head attached to neck in graceful, angular manner, rather of the obtuse order, jugular gutter well marked.

Withers. Well developed, high and not too wide, unless animal be fat there should be a line of demarcation where the neck leaves off and the withers commence, back straight and rather short, loins broad and strong.

Croup. Rather long and slightly sloping with dock coming out high up, tail carried straight, well out from the body in an arched and graceful manner.

Chest. Somewhat cone-shaped with good, broad base behind, apex between forelegs, where the animal may be narrower in proportion than other breeds, the cavity should be deep from above downwards especially at the girth, ribs long, well sprung, with well marked angles, breast muscles well defined and prominent but not too wide.

Shoulder. Oblique from above downwards and forwards, the blade bone being well covered with hard, well developed muscles.

Elbow. Well muscled and lying close to chest.

Forearm. Long, well developed and strong, well clothed with hard, well developed muscles, having grooves of demarcation between them, showing the outlines of each individual muscle.

Knee. Clean, straight, large and strong in all directions, the bone forming the back part somewhat prominent, an absence of malformations.

Knee to Foot. Cannons short, broad, flat and clean, tendons standing out plainly, hard and whipcordy, lines of demarcation between tendons and ligament and between ligament and bone, an absence of beefiness and long hair, skin lying close to bone and tendon, tendons not too much pinched below knee, fetlock joint well developed and strong, pasterns somewhat lengthy and of medium obliquity.

Foot. Rather smaller in proportion than in other breeds, round, strong and tolerably deep wall, sole concave, frog well developed, heels full and not too deep, must not turn toes in or out when standing.

Haunch. Well clothed with hard, well developed muscles, showing grooves of demarcation between them, thick through ham, quarters broad and strong.

Stifle. Strong and well muscled, not bulky.

Gaskin. Clothed with hard muscles standing individually boldly out, hamstring strong, prominent and whipcordy.

Hock. Deep and strong in all directions, all points well developed but not rough, an absence of malformations or puffiness, point very well developed, straight on posterior border, the whole joint clean and hard and of an angular order.

Hock to Foot. Cannons short, wider and flatter than fore ones, clean, no beefiness, no feathering, tendons well marked individually and must not have a pinched appearance below joint, but very gradually taper in width from hock to fetlock, skin lying close to bone and tendon, fetlock joints large, clean and strong, pasterns rather lengthy, strong and of medium obliquity.

Foot. Smaller, not so round as the front ones, sole more concave, frog well developed, heels strong and not too deep.

Color. Bay, brown, chestnut, gray, black with reasonable modifications.

Skin. Soft, mellow, loose, not like parchment, hair forming coat fine, silky and straight, hairs of mane and tail although coarse, must be straight and soft in comparison with other breeds.

Temperament. Mild, not vicious, energetic, inclined to be impetuous, not too nervous.

Action. Prompt, free and elastic, not too much knee and hock action, but going rather close to the ground, especially in the canter or gallop, must not paddle or rool fore feet, nor go close enough behind to interfere, good walker.

Weight. Say 1,050 to 1,300 lbs.

Height. Say 15½ to 16½ hands.

Conformation of the Thoroughbred Gelding or Mare.

Head. Rather small, ear fine and pointed, not too long, cranium nicely rounded, forehead flat and broad, eye large and prominent and gentle in expression, nasal bones straight in front and slightly dished laterally, nostrils large, firm and flexible, lips firm, mouth of medium depth, muzzle tapering and small, cheek clothed with hard, well developed muscles, branches of lower jaw well spread apart at their angles.

Neck. Clean cut and rangy, crest well developed and whipcordy, but not so full as in the stallion, the point where the neck leaves off to be well marked in front of the withers, jugular gutter well marked, wind pipe standing out independently of the rest of the neck, attachments of head to neck well marked and to be rather angular, of the obtuse order.

Withers. Well developed and high, forming a well marked prominence over the shoulder, the top of which should not be thick ; the back, springing from the posterior aspect of the withers, should be straight and short, loins broad and well muscled.

Croup. Rather long and somewhat sloping, with dock coming out well up, tail carried straight, well out from the body and in a gracefully arched manner.

Chest. Somewhat cone shaped with good broad base behind, apex between shoulders rather narrow, but deep through the girth, ribs long and well sprung with well-marked angles.

Shoulder. Coming from high, sharp withers, should be oblique from above downwards, blade clothed with hard muscles, well formed but not bulky.

Elbow. Well muscled and lying close to chest.

Forearm. Well developed and strong, with muscles standing boldly out and well defined, marked from each other by grooves.

Knee, knee to foot, foot, haunch, stifle, gaskin, hock, hock to foot, foot, color and skin, same as stallion.

Temperament. More docile than the stallion, but still very energetic.

Action. Rather lighter on foot than the stallion ; in other respects the same.

Weight. Say 850 to 1,250 lbs.

Height. Say 15 to 16½ hands.

The saddle horse may be of the same general type as the thoroughbred (mare or gelding), but if not thoroughbred will not have as much quality. Must have good manners, a mouth that responds readily to the hand of his rider. Graceful and elastic actions in all paces being essential.

We will now give a few illustrations, showing some of the desirable and undesirable points of conformation of the horse. From these illustrations the breeder will be able to inform himself as to the various features and traits of disposition, also the correct and incorrect position of the limbs, feet, etc.

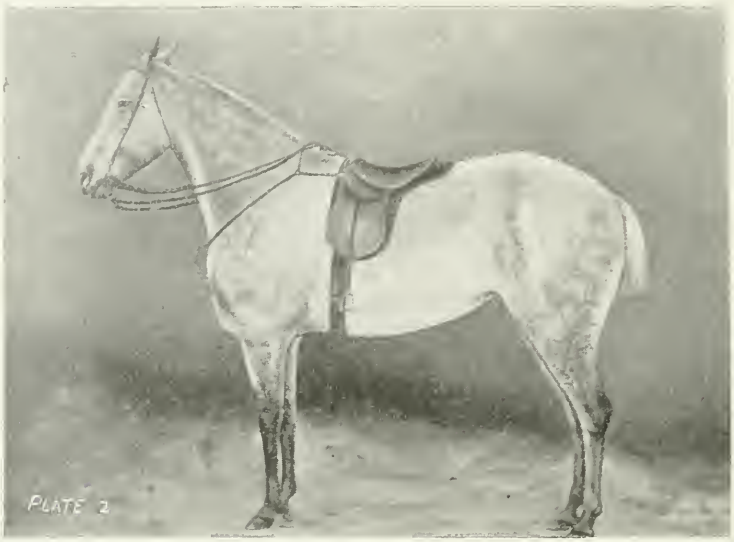
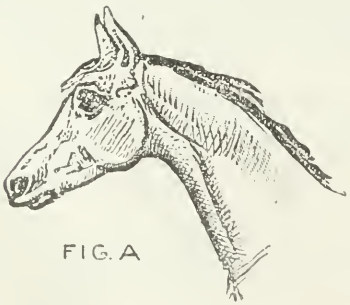
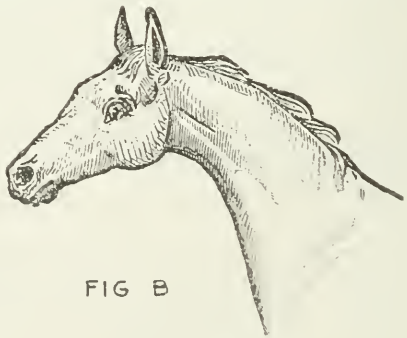


Plate 2. The writer's favorite hunter, "Duster." Grey mare, born 1876; 16 hands ¼ inch high; weighs 1,200 lbs.; by Henry Clay, by Whalebone, by Lexington. Dam said to be by imported Sir Tatton Sykes.

This mare is a good type of a heavyweight hunter, rather plain in head and neck, otherwise very hard to find fault with. Her eye, ear and general expression denote intelligence, ambition and promptness. She stands perfectly. Note the position of each limb—her withers, back, loins, croup, shoulder, fore limb, haunch, quarters and hind limb and feet as nearly perfect as can be found. The quality, size and shape of bone and tendon denote strength and durability. Note the gradual decrease in breadth of the hind leg from hock to fetlock joint. Note position of feet, each one planted firmly, toeing neither in nor out—ribs long and well sprung, giving large lung and abdominal capacity. She is now 23 years old and as lively as a five-year-old, and sound. She has done a great deal of work in both harness and saddle, both on the flat and across country with over 200 lbs. up. She is very prompt and ambitious, never requiring either whip or spur, and at the same time safe for a lady to ride or drive. The cut represents the mare at 14 years old, but is a perfect picture of her to-day, except in color—she is now white.



THOROUGHBRED HEAD.



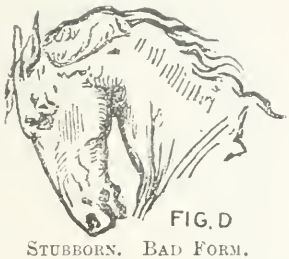
Trotting Form.

Fig. A. Shows a very good head of a thoroughbred. The general expression and attitude denote intelligence, ambition and docility. The crest is nicely arched, but not bulky; head gracefully attached and well carried; all muscles and the jugular gutter well marked.

Fig. B. Shows a good head and neck of a trotting or road horse.

Fig. C. Shows a good head, but the neck is very deficient, being too long and thin, and much too fine where attached to head. Necks of this description are usually accompanied by a small head, with little space between the angles of the lower jaw. Consequently, the space occupied by the larynx (that cartilaginous box at the commencement of the windpipe) is limited, not allowing sufficient room for expansion when large quantities of air are taken into the lungs during violent exercise, and as a consequence the animal is very liable to become a roarer.

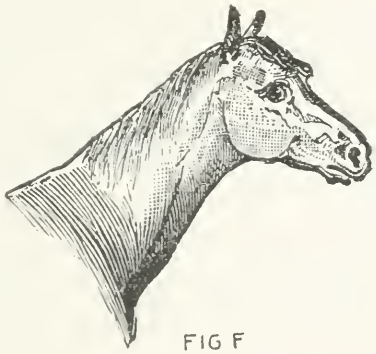
Neck too Thin.



Stubborn. Bad Form.

Fig. D. Represents an ill-formed head and neck. The neck is attached to the head in an ill manner. The mouth or nose is turned in too much towards the breast, which renders the animal practically uncontrollable unless a check rein be used to keep his nose out. The eye, ear and general expression denote stubbornness and ill temper. For purposes of draft, the neck should be very much thicker and more heavily muscled than in light horses, but nevertheless the head should be properly attached.

Shapely and Muscular for Draught.

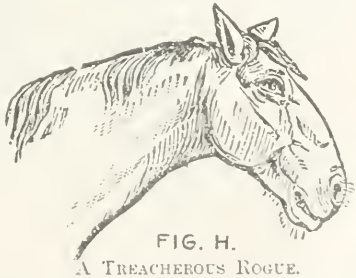


Altogether Bad.

Fig. E. Shows a shapely, muscular neck for draft, rather thick at the attachment to the head, but at the same time well proportioned. The head is broad, strong, and rather large at the muzzle, not a serious fault even with driving horses, although a fine muzzle looks more attractive, and with large flexible nostrils this conformation may be very well marked.

Fig. F. Shows a badly formed neck and shoulder, and an ill-proportioned, badly formed head.

An Ewe Necked Brute.



A Treacherous Rogue.

Fig. G. Shows an ewe-necked vicious brute, the head set on too high, the dished face, shape and position of ears, wild expression of the eyes and position of lips denote a vicious and dangerous disposition. The Roman nose also denotes stubbornness.

Fig. H. Shows a strong, muscular neck and head, but at the same time the position of the ears, the eyes high in the head with a surly expression, the Roman nose, thick neck and jaw denote a treacherous and unsafe horse. Such a horse if kept properly under control by a competent driver may be fairly well managed, but in careless or incompetent hands is liable to become vicious and intractable at any time.

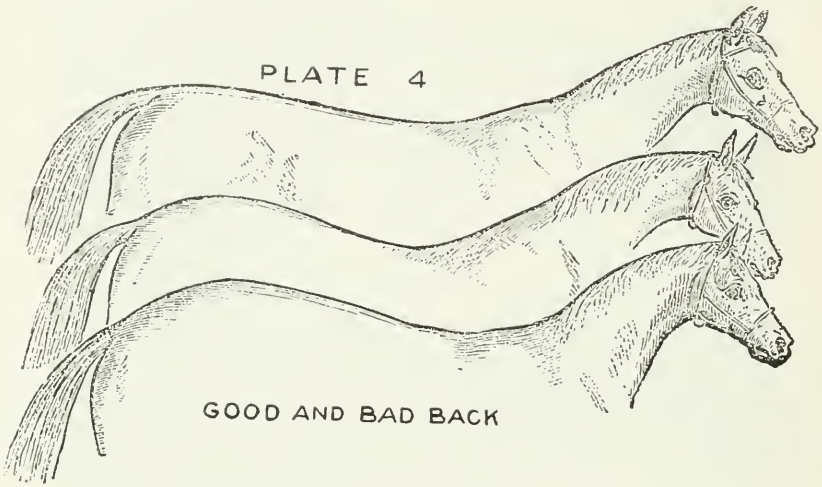
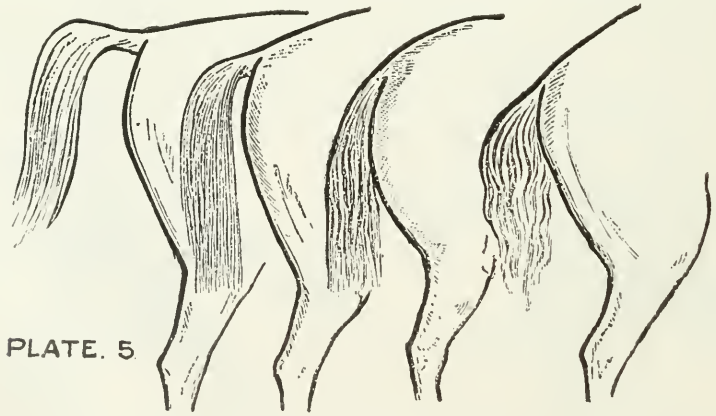


Plate 4. Shows different conformations of the back. The back should be straight and of medium length ; the straighter and shorter it is the more it denotes strength, while the longer it is, and especially if it also be hollow, the more indicative it is of weakness. However, very short backs are not desirable, as a certain amount of length is essential in order that the animal may have action and a certain amount of speed. Though shortness of the back indicates strength, particularly as regards carrying weight, we must remember that too much must not be sacrificed for any one point, and a horse with a very short back is apt to overreach (forge) unless his shoulders be very oblique. Backs which are in their original formation hollow, invariably become more so under the influence of weight and age. This is particularly noticeable in stallions that are used in the stud. In fact all backs, though originally straight, become more or less hollow with age. This effect is partly due to the ordinary mechanical action of weight on a given line, and partly to wasting away of the muscles in old age. A horse with what is called a roach back is usually rough and uneven in his paces and inclined to forge. The formation is favorable to strength, and unless the peculiarity be very marked, especially if the quarters are good, and the shoulder strong and oblique, he will generally be a serviceable animal.



Good to Bad Hindquarters.

In the illustration the top figure shows a very straight back and croup—with the dock coming out very high up. The centrel figure, a hollow back and drooping croup, and the lower figure a roach back.

Plate 5. The hair of the tail usually indicates the breeding of a horse to a certain extent. That of well bred horses is generally straight and fine. A thick, coarse or curly quality of hair usually denotes want of breeding. The tail should be carried firm, straight and well away from the hind quarters. It should be set on almost in a line with the back bone. In the coarsely bred animal the tail is usually set on low down, possesses little muscular power, clings to the quarters, and altogether looks mean. Fine, curly hair is occasionally, though seldom, seen even in the tails of thoroughbreds.

In the illustration the figure on the left shows a tail the dock of which comes out high up, and the tail is well and gracefully carried. The second figure shows the dock coming out lower down from drooping croup, and tail not so well carried. In the next figure this is more marked, the animal hugging the tail, while the figure to the right shows a tail with coarse, wavy hair coming out very low down from a very sloping croup and meanly carried, the hams cut away and weak, and altogether the parts of a mean looking, and generally unserviceable animal.

Plate 6. Let us now view the position of the hind legs, viewed from the side, the horse standing.

Fig. I. Shows the commonly received idea of the correct position, but the whole limb is placed rather too far back, and it is rather too near the perpendicular from point of hock to fetlock pad.

Fig. J. Shows a more correct position, the limb is more under the centre of gravity than Fig. I, the hock not quite so far back and there is a slight deviation forward from hock to fetlock.

Fig. K. Shows a horse standing too straight, ham string not well developed, and rather a deviation backwards from point of hock to fetlock, altogether a rather weak limb.

Fig. L. Shows the limbs too much bent, sickle shaped, giving the horse a mean appearance, and at the same time the hock is not strong, and disease, especially curb, is easily produced.

Fig. M. Shows the leg from hock down placed too far behind ; this conformation indicates weakness and is usually associated with defective action.

Fig. N. Shows the point of the hock poorly developed, the hock is not "well let down," always accompanied by poor hock action.

Fig. O. Shows the opposite and desirable conformation, the point of hock well developed. The hock is "well let down." This conformation indicates good leverage, and is usually accompanied by good action. In this figure the hock alone must be considered, not its position in respect to the body.

Coming now to the rear view of the hind legs.

Fig. P. Shows the points of the hocks too close together (cow hocked) with a lateral deviation outwards of the limbs to the feet. He points the feet outwards, is splayfooted. The points of the hocks should not approach each other in this manner, but should stand squarely, turning neither outwards nor inwards, and the limbs should maintain this position down to the foot, which also shou'd be planted straight forwards and backwards.

Fig. Q. Shows the hocks too far apart, the points turned outwards, with a lateral deviation inwards from hock to foot, the toes turned inwards—parrot toed.

Coming to the fore-quarters the illustrations will give a good idea of shape, obliquity of shoulder, setting on of the neck and carriage of the head.

Fig. R. Shows good conformation of head, neck and shoulders.

Fig. S. Shows shoulders too upright, neck too short and thick, throat thick and heavy, ears and eyes badly placed, and general expression bad.

Fig. T. Shows correct position of fore-limb and foot.

Fig. U. Shows feet too close together, the horse is bandy-legged.

Fig. V. The feet are too wide apart, the horse straddles.

Fig. W. Shows the toes turned out, when travelling he will rool his toes inward and in all probability strike the opposite limb some place between the pastern and knee or even above the knee, according to the height of action. This is called speedy stroke, and is very undesirable, as it necessitates the wearing of boots for protection and is liable to cause him to stumble.

Fig. X. Shows the contrary conformation ; the toes turn inwards, giving the animal a paddling action, which has a very clumsy and unattractive appearance. There is considerable waste motion.

Fig. Y. Gives a side view of fore leg. The position is correct, the knee large, strong and straight, neither bending forwards "knee spring," nor backwards "calf kneed."

Fig. Z. Shows the knee bending backwards "calf or buck kneed." This conformation, if well marked, causes undue strain on back ligaments and tendons.

Fig. AA. Shows a small weak knee, with the tendons tied in or pinched below the joint.

Fig. BB. Shows the pastern too long and weak.

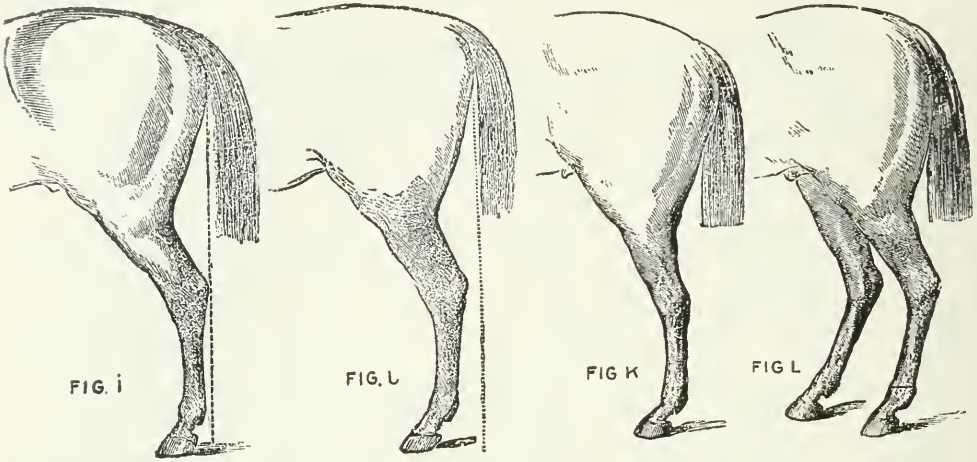
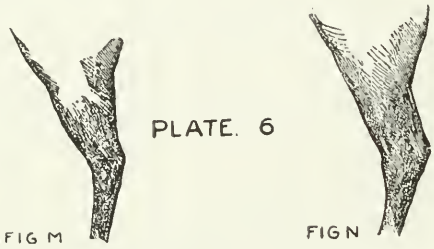


PLATE. 6



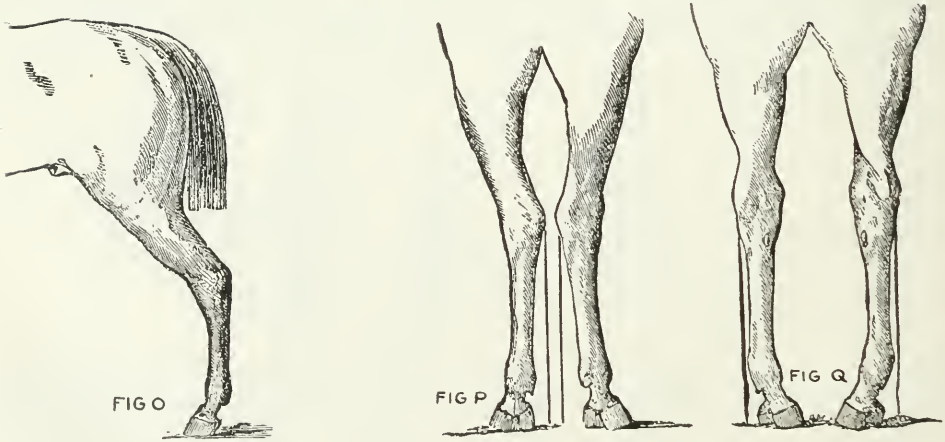


Fig. CC. Shows the pastern too short, there is a want of flexibility, the action will be stiff and stilty.

Fig. DD. Shows a good limb in a correct position.

Fig. EE. Shows the pastern too short and upright, the action will be stiff and stilty, especially for saddle purposes. The concussion is so great that parts are very liable to disease.

Fig. FF. Shows the opposite conformation, the pastern is too long and oblique, the strain consequently undue upon the back tendons, which as a consequence are liable to disease.

Fig. GG. Shows the correct position of foot in relation to the breast.

Fig. HH. Shows the foot planted too far back.

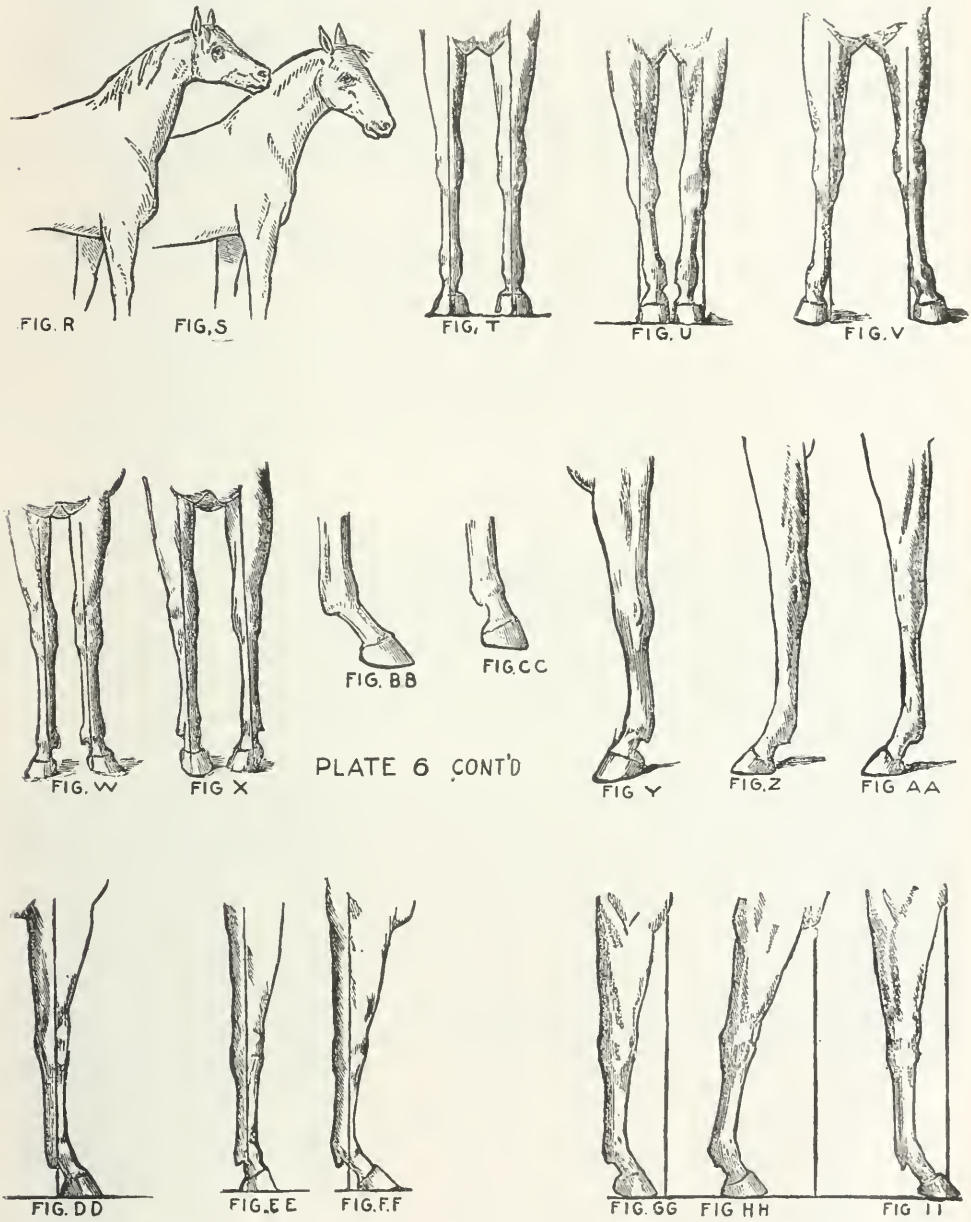


Fig. II Shows a weak knee and fetlock. The limb is straight, but out of proper position on account of weakness.

The reader who carefully examines these illustrations should be a fairly good judge of how a horse should look, either from a front, rear or side view, both as to the body and limbs.

CULTIVATION OF THE SOIL.

By J. B. Reynolds, B.A., Professor of Physics, O. A. C., Guelph.

To have the soil in the proper state of tilth is of more importance than to have it rich. A rock may contain the principal ingredients required for fertility, but it does not afford a good seed-bed or a reservoir for water. If a soil is well cultivated, at the right time and in the right manner, even though it is not rich there is a better chance for the crop than in a richer soil in which the physical conditions are unfavorable. Hence cultivation of the soil should be the first consideration of the farmer, for upon this all other conditions depend.

There are various objects attained by cultivation, some of which are : (1) to prepare a seed-bed ; (2) to control the supply of water in the soil ; (3) to check and kill weeds ; (4) to bury manure ; (5) to increase the depth of fertile soil. The purpose of this article is chiefly to consider Nos. 2 and 3, and the other points incidentally.

Water dissolves plant-food, that is, it takes up the solid plant-food that it finds in the soil, and liquifies it. Since plants cannot take food in the solid form, without water the plant must die, no matter how rich in plant-food the soil may be.

Water carries food to the plant. Animals can move about in search of food, but the plant cannot do this, Nature, which fixes the plant solidly by its roots to one place, must provide a means for carrying food to it. Water is the agent that Nature has provided.

Water enters the root of the plant, carrying the plant-food with it. It then distributes itself throughout the stem, branches, and leaves of the plant, filling all the cells and giving to the plant turgidity or stiffness. A lack of water is noticeable when the plant wilts, that is, when the turgidity diminishes.

Water makes the plant grow, by keeping the cells filled and distended.

The Evil Effects of too Much Water. It is quite possible to have too much water in the soil. This condition frequently occurs, as in low-lying lands, or on any land early in the spring or after heavy rains. Some of the evil effects are : It is impossible to cultivate very wet lands, and sowing and planting are often delayed beyond the proper time.

Wet land is always cold land. Heat is necessary for sprouting of seeds and for the growth of crops, and the wet soil will often hinder the crop in this way.

When the land is too wet, the pores of the soil where air should be are filled with water. Under this condition, crops are often what is called "drowned out." Too little air for the roots is the principal cause of this. Low, wet places in the field often grow a sickly-looking crop.

How the Soil Holds its Water. Water is held in the soil in three ways : first, as *capillary water* ; that is, water that surrounds the soil grains and is held there by attraction. It is the direct source of moisture for plants. The soil, when in the proper state of tilth, has the power to draw this capillary water in any direction, up or down or sideways, from a moist to a dry spot. In a dry time, as the plant root absorbs the water immediately around itself, and leaves that part of the soil dry, this dryer soil draws on the resources of the moist soil below, and by this means the plant is kept supplied with moisture.

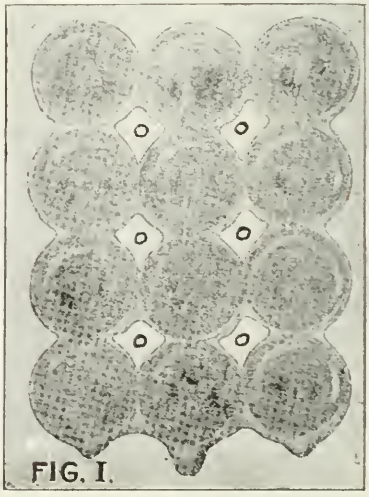


FIG. I.

Showing air spaces O in the soil, and soil grains surrounded by capillary water.

The amount of capillary water present in the soil is proportional, other things being equal, to the amount of free surface within the soil, that is, the total area of the surfaces of the detached soil grains. Anyone fond of a little calculation can easily prove that in a given volume of soil the total amount of area over which the capillary water can creep, varies directly with the smallness of the particles. The smaller the grains, the more capillary surface. The larger and coarser the grains or lumps, the less surface. Hence there is a direct relation between tilth and water supply. Tillage, which makes the ground fine and mellow, increases the total capillary surface within the soil, and consequently the water capacity.

Hygroscopic water is the second form in which water is held in the soil. From the derivation of the word, this term means the moisture that any soil is capable of absorbing from the

air. If a soil is thoroughly dried at the temperature of boiling water, weighed, and then allowed to stand in the open air, it will increase in weight on account of absorbing water. The amount of moisture absorbed will depend upon the nature of the soil, sandy soils absorbing in this way very little, while a clay soil or one rich in humus will absorb a considerable amount. This hygroscopic moisture is supposed to be taken *into* the soil grains, not held on the outside, and its effect is to expand the soil, in much the same way as peas or beans will swell when put in water. It is not likely that plants are able to make direct use of this form of water, since, it has been determined, plants will wilt in all sorts of soil before the amount of moisture present has been reduced to the hygroscopic limit.

Free water is the third form of soil water. This water flows under the influence of gravity, and is the source of wells and springs. Its presence in the soil within the space usually occupied by the roots of growing crops, is decidedly injurious to the crop, since the water excludes the air necessary to the life and health of the plants. When it exists in the soil below the feeding ground of the crops, it is of great value, for it constitutes the reserve supply from which the crop can draw moisture in dry weather.

Importance of Good Tilth. We have seen the importance of the right amount of water, enough and not too much. Can the farmer control conditions so as to have just this right amount, neither too much nor too little? Mr. T. B. Terry, the well known Ohio farmer, has said that with a fair amount of water in the soil in the spring, he is independent of rainfall, and can guarantee to his growing crops moisture enough whether it rains or not. By irrigation, it may be said. No, by careful and intelligent cultivation of the soil before and after seeding. The amount of water in the soil can to a very large extent be controlled by work intelligently applied to the soil. And by 'controlling' I mean allowing the surplus water to run off, as well as preventing a too rapid escape of the moisture necessary to the plant. Good tilth, then, means that physical condition of the soil that will enable the crops to make the most economical use of the water and plant food in the soil. How to attain to that good state of tilth is therefore an important study.

Soil Ingredients in Relation to Tilth. The ease or difficulty of getting the land ready for a crop depends largely upon the nature of the soil, that is, the physical ingredients, the proportions of gravel, sand, silt, clay. All of these are simply decomposed rock, broken up to a greater or less degree of fineness, gravel being the coarsest and clay the finest of the rock-particles. A gravelly soil is one with a certain amount of gravel and coarse stones in it. A clay soil is composed mostly of very fine grains. All of these soils require special treatment, and it is a great mistake to suppose that what is good for one soil is good for all. If a simple uniform recipe be given for the treatment of all kinds of soil, the science and practice of agriculture would be infinitely easier than it actually is.

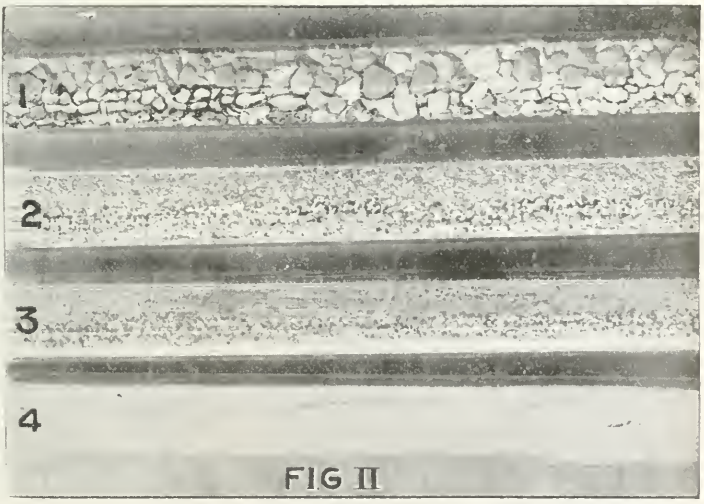


Fig. II

1. Gravel: 2. Coarse sand: 3. Fine sand: 4. Clay.

Showing various kinds of texture, and the number and sizes of air-spaces in different soils.

The value of Humus as part of the Soil. The constituents mentioned above are mineral; humus is a vegetable constituent. It is to be found in the pure state in forests or on new land, and it is also found mixed with the mineral parts in all good soils, imparting to them their dark color. Humus has the following important properties:

It has the power of retaining large quantities of water. This property makes it an indispensable part of coarse sandy soils, a great defect of which is their small water-holding power.

As a consequence of its high water capacity, humus prevents the leaching and draining away of rain water and plant food that may be dissolved in it. Since leaching is another great defect of sandy soils, humus becomes doubly valuable as an addition to these soils.

Humus has little or no adhesiveness. This property is also of great value. When humus is mixed with clay, in such proportions as may be found in a good fertile clay soil, this non-adhesiveness of the humus corrects the excessive stickiness of the clay.

How to Manage Heavy Clay Soils. It takes a patient as well as a brainy man to manage a clay farm successfully. Clay has to be humored and petted and indulged like a spoilt child, and even when you think you have done your best to get it into good temper, all at once it sulks and becomes intractable.

If worked when wet, heavy land falls into the state called puddling; that is, the soil becomes reduced to an extreme state of fineness by the working and the action of the water in it, the air is driven out of it, and the sticky stuff settles down and dries out into a mass almost as solid as the original rock. The best thing to do with such a soil when it is wet is to let it alone. Then again, it is almost impossible to work it when dry on account of its extreme hardness.

FIG. III.

Showing clay soil in a lumpy state. In this state it affords a very poor seed-bed. It also fails to bring water from below to supply what the plants need.

The man with the clay farm must choose his time very judiciously for working the land. He must not work it when it is wet, and cannot work it when it is dry. But to off-set these disadvantages, clay has many good qualities. It can retain large stores of water, it does not allow leaching of plant food, and is naturally fertile, or in other words is a 'strong' soil. This natural fertility is undoubtedly due to the great retentive and absorptive power of clay: the fertilizing ingredients that come down with the rain or that are supplied by manure and the decay of plants, are absorbed instead of being allowed to leach away. So that while it perhaps requires more skill to manage heavy land, it makes up in fertility what in demands by way of extra cultivation.

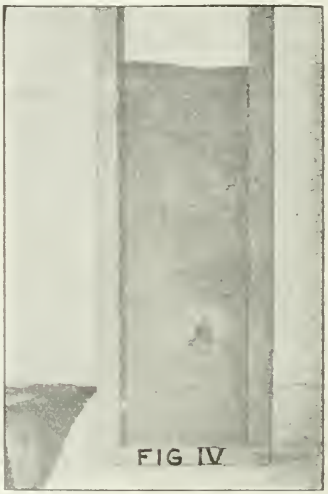


FIG. IV.

Showing clay soil in first-class condition. This affords a prime seed-bed, its water capacity is large, and its power to carry water to and fro for the plants is all that can be desired. This condition can be reached only by proper drainage, judicious cultivation, and plenty of humus to make it mellow and friable.

The Importance of Drains. To come to practical details, the farmer must first consider how to correct or ameliorate the defects of heavy land. And the very first essential is *drainage*.

Without drainage all other attempts, however well carried out, must wholly or partially fail. The free water in the soil must be disposed of. It is seldom that a heavy soil has a sufficiently open subsoil to give natural drainage, and the farmer is consequently driven to a system of artificial drainage. This is not the place to discuss the methods of drainage. The writer desires only to point out the necessity of it, believing that once a farmer is convinced of the "why," he will soon find out the "how." The drain, by taking away the free water that occupies the pores of the soil, allows air to pass through the soil. The soil may be said to *breathe* through the drain, for there is a continuous movement of air to and fro, up and down, caused by the variations in the pressure of the atmosphere. When the soil is comparatively dry, there is a good deal of air in its pores. Then when a rain comes, it fills the upper end of these pores, and if there is no outlet for the air below, it is imprisoned and, exerting a backward pressure on the water above, prevents it from entering the soil more than an inch or two. It may happen, therefore, that in an undrained soil a quick heavy summer shower is forced to run off the surface, while the land below the first inch is as dry as ever. From this we see the truth of the paradox that a good underground drain is a safeguard against drouth. This changing of

air which results from good drainage, also warms the land simply by introducing warm air into it, while the same fresh air induces those processes within the soil that liberate the plant food. So that drainage is indirectly a source of fertility, since the growth of crops does not depend on the total amount of fertility in the soil, but on the amount available. By drawing off the surplus of free water in time, the drain aids in preventing baking or the formation of hard-pan. By emptying the free water space, the plants are encouraged to take root more deeply in the soil, whereas if the soil is full of water the roots are compelled to feed at the surface. In a period of drouth these shallow-rooted plants will suffer for lack of moisture when the deep-rooted ones are feeding in moist soil farther below. Here again the drain is a safeguard against drouth

In heavy soil it is a mistake, according to the best practical authorities, to lay the drain deep. Two and a-half feet to three feet is deep enough for a close heavy soil; because the object of the drain is to remove the surface water as quickly as possible, and if the tile is buried four feet deep below the surface and the water has to find its way through that space of fine clay, the drain might just as well be away altogether. And although there may be many theoretical arguments in favor of deep drains, after all the practical necessity of getting the water away as soon as possible calls for shallow draining in heavy land.

Humus to Improve the Texture of Clay Soils. As already seen, the chief defects of heavy land are, stickiness when wet, lack of mellowness when dry, and a tendency to coldness. A good proportion of vegetable matter will correct all of these defects. By its non-adhesiveness humus will correct the first two mentioned and by its dark color it will allow the heat of the sun to penetrate into the subsoil, instead of reflecting that heat as a light colored soil will do. In order to prove this fact, the following experiment might be quoted:—Last October, for a number of days in succession, two lots of soil, both dry, the one dark in color and the other light, were set in the open air so as to catch the heat of the sun's rays. On one day between seven in the morning and two in the afternoon, when the highest temperature was reached, the dark soil rose thirty degrees in temperature and the light soil twenty-two, both being at the same temperature at the first. The dark soil was principally vegetable matter, and the other fine sand The practical farmer, who knows that the difference

Fig. V.

Showing clay that has been wet and is now dried out. This cracking is due to its adhesiveness and the fineness of its grains. Such a condition is unfavorable to plant growth, especially small tender plants.

Fig. VI.

Showing the same clay as in the previous illustration, and treated in the same way, with the exception that there is in the latter a quantity of humus mixed with the clay. This figure illustrates the effect of humus in mellowing heavy soils.

between a cold ill-conditioned seed bed and one that is warm and mellow, is the difference between a good crop and a poor one, will also know how to appreciate the value of humus in the soil, and will set to work to increase the supply of his own fields.

Lime to Improve the Texture of Clay Soils. The well-known properties of lime need only be mentioned here. The effect of lime on heavy land is peculiarly beneficial, so much so that it is a wonder that more of it is not used. Its physical effect is the same as that of humus, but much more pronounced, that is, it removes the binding and baking tendency. The writer is strongly convinced that the cost of buying and spreading lime on heavy land, unless it is known that lime is already present in sufficient quantities, will be returned to the investor many times over in increased yieid and ease of working.

Treatment of Sandy Soils. Less need be said concerning light soils, since, so far as the mere mechanical working is concerned, they are much less difficult to treat. The principal defect of a light soil is its lack of power to absorb and retain moisture and fertility. Deep cultivation should not be practised on a light soil, since that tends to loosen the subsoil, which is already too loose. All else that need be said on this subject may be found under the topics 'Humus' and 'Surface Cultivation.'

Surface Cultivation for all kinds of Soil. By this term may be understood the stirring of the surface soil to a depth of a few inches, without inverting or mixing to any extent. This is opposed in principle to deep plowing, trenching, spading or any such method of working the soil that turns down the upper soil and brings to the surface new and generally crude material. The two methods, as above stated, are radically different in principle. The one claims that the upper soil should be, and generally is, more fertile than the soil below, and therefore affords a better seed-bed. According to this principle it is a mistake to turn down rich well-decomposed soil, and bring up for a seed-bed that which is crude and inert. It claims that a good system of farming makes the upper soil more and more fertile with each successive season, and that this fertility is best kept within a few inches of the top, leaving the subsoil to perform its natural function of storing and carrying water.

The other system claims that there is unused fertility in the soil extending to considerable depths, and that it is best, after exhausting the fertility of the upper soil, to bring up new, unexhausted material, let the air and the water act on it for a little while, setting free the latent fertility; then this new soil will be in a better state than what has been turned down.

The latter system has ancient practice in its favor, as for instance the old method of trenching. This consisted of digging a trench three or four feet wide and two or three feet deep across the end of the field, filling it with the earth from a similar trench dug parallel with it, and so on across the field; the result being that the upper soil is completely buried to a depth of two or three feet, and all the soil is thoroughly mixed. This is deep cultivation in the extreme. Deep plowing gives the same result proportionately to the depth.

In virgin fields, where the rich vegetable mold extends to a practically unlimited depth, deep plowing and inverting will undoubtedly give the best results for the least cost; for when the fertility of the upper soil is partly exhausted the lower layer may be brought to light and its reserve power used. This method has been used in this country from pioneer days. But with what result? The fertility of the soil has been decreasing steadily year by year. Two years ago the writer had a sample of soil sent from a new district in Northern Ontario, along with the following question: "Is there enough fertility in this soil to stand cropping continuously for a number of years?" The first occupiers of the land on too many farms in Ontario assumed that the fertility was practically inexhaustible. And the problem that their successors to-day have to deal with is, how to restore the exhausted fertility; and not only that, but they have also to consider how to restore the fine texture and mellowness of the virgin state. Where the vegetable matter has been exhausted the texture has been correspondingly injured.

Of course, this lamentable condition of so many Ontario farms is not directly chargeable to the practice of deep plowing, but to the fact that deep plowing enabled the pioneer farmers to disregard the laws that govern soil fertility, and to stave off beyond the limit of their active years the inevitable impoverishing of the land; thus putting themselves in the position of improvident business men, who, beginning with so much capital invested in buildings, machinery and plant, make themselves rich with the earnings of the concern but allow the establishment to fall into decay. The loss is not always theirs, but generally their successors'.

This is the problem that the majority of farmers in Ontario have to deal with:—How to make the land more fertile and at the same time make a living off the land. It is a good thing to have a deep rich soil, but it will take a generation to attain it. To attain a soil that has a fair amount of vegetable matter to a depth of a few inches is within the limits of ordinary patience.

For the last six years the writer has been able to observe the effects of a method of cultivation, combined with a systematic rotation, in which the plow was used only once in four years on any one field. The land has been worked by means of implements that *cut*, *crush*, *pulverize*, and *loosen*, but *do not invert*. The results have been, cleaner and cleaner land every year, better and better crops, and a steadily increasing fertility; so much so that with reference to a certain field the color of the soil has darkened appreciably, showing a considerable increase in humus.

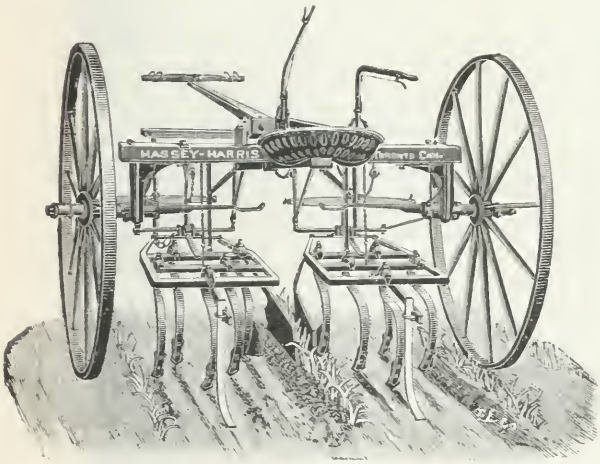


Fig VII.
Two-horse Corn Cultivator.

Surface Cultivation in Detail. To make this matter clear, it would be well to follow a rotation through. Suppose the second season's cutting has been taken off the hayfield. The stubble is plowed about August, as early as possible in order to take advantage of the summer's heat to decompose the roots. Then it is harrowed to loosen the surface and prevent the escape of moisture, which is also necessary in decomposition. After that, it is cultivated frequently, without tearing up the sod, the objects of the cultvation being, to destroy the weeds that may be growing, and to enable the sod to rot by keeping in the moisture. As the manure is plowed in with the sod, a good supply of humus is undergoing preparation for the next series of crops, and will be well decomposed before the cold weather sets in.

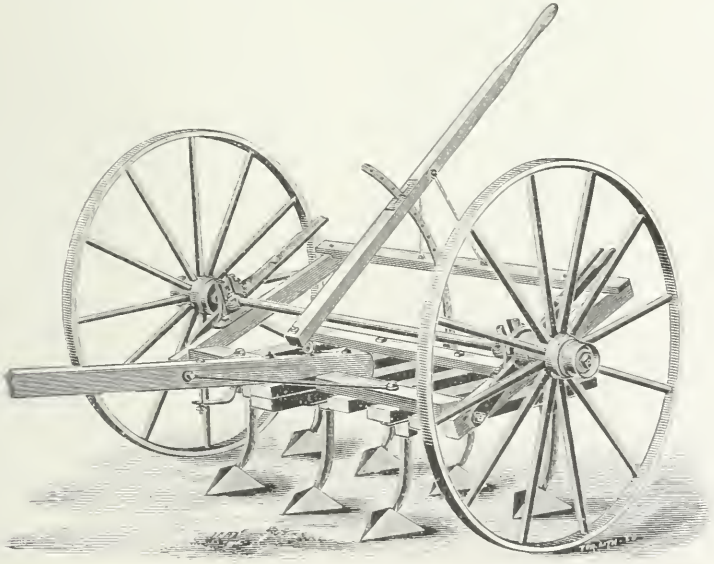


Fig. IX.
A Rigid Foot Cultivator, almost indispensable in surface cultivation.

The last work of the season on the sod is drilling up, instead of the older practices of ridging up. Drilling is simply the same process as preparing for sowing turnips by running drills through the field with a double moldboard plow. This ribbing serves several purposes. First of all, the best part of the soil, being at the surface, is carried into the drills. More or less of the rain that falls in the late autumn will be shed by these ridges into the furrow between.

Fig. VIII.

Breed's Weeder, cultivating rake. Used also for cultivating young corn, potatoes, etc.

FIG. X.

Showing corn-field on July 21st, '99. The result of intelligent cultivation.

There is on this account less chance of the plant food, most of which is heaped into the drills being leached away. Secondly, there is more surface exposed to the action of frost, which is valuable pulverizing agent in heavy soils. Thirdly, the ridging will allow a more rapid drying in the spring, and consequently earlier working and seeding.

One of the crops that may follow this treatment is ensilage corn. In the spring the ridges are smoothed down and a good seed-bed formed, all without using the plow, and then the corn sown. After that, surface cultivation kills the weed and conserves the moisture.

After the crop of corn is harvested the double-faced plow is used again to prepare the land for the winter. Care is taken to bury the roots of the corn in the drill, where they remain rotting for two years before the plow disturbs them. Everyone who has worked land where there are loose corn-roots scattered over the field, will be able to appreciate the method which buries them out of sight.

After the corn, oats or barley or spring wheat may be sown, and the land then seeded. This completes the rotation. It should be observed that the land is plowed but once in three or four years, according as the clover stubble is allowed to stand for another crop or not.

The writer wishes it to be understood that the above detailed account is given, not for the sake of explaining the rotation, which is only part of a complete system, and which in any case may not suit other circumstances ; the details are given in order to show how surface cultivation is carried on through a complete cycle of operations.

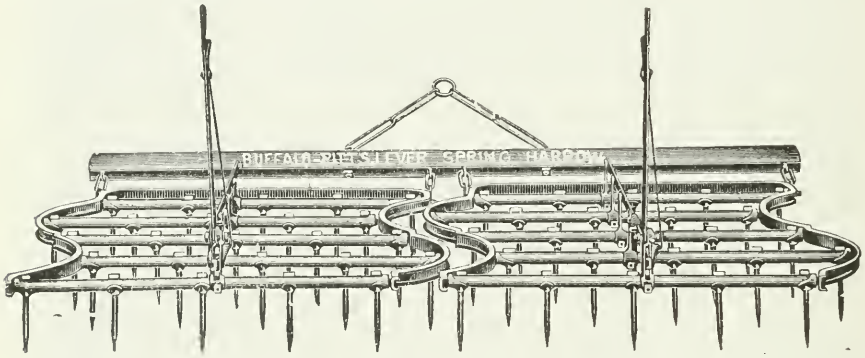


Fig. xi.

Buffalo-Pitts, Lever Spring Harrow.

Surface Cultivation and Weeds. As a matter of fact, surface cultivation affords the best means for destroying weeds. There are various ways in which weeds may be successfully combatted, depending in part upon the nature of the weeds themselves, and in part upon the exigencies of the crop. The good farmer is seldom on the defensive in fighting weeds. He fights them in his own way, and with what crop he pleases. It is only when the weeds get the upper hand that the farmer is compelled to sow a particular kind of crop in order to be able to keep the weeds in check One method, then, is to prevent the seed from maturing, either with a hoed crop or an early maturing crop such as clover. The second method is available when a late crop allows the weeds also to mature. In that case, surface cultivation after harvest will encourage these seeds to germinate the same season, when the young plants can be destroyed. To bury the seeds by deep plowing, and then sometime when it will be impossible to destroy the weeds, to bring the seeds up again to germinate, is a tremendous mistake, and yet one that is the rule rather than the exception. Last year a field near the Experimental Farm was planted to potatoes, and carefully hoed and cultivated through the summer. It had been badly infested with mustard. This year it is sown to oats, and the field is as yellow as ever with the weed. Surface cultivation last year destroyed all the plants that grew, but beneath the surface thousands of seeds were waiting their chance. That chance came when last fall after the potato crop had been taken off the field was plowed. Now if that field had been drilled simply to prepare it for the winter, it is likely that very few mustard plants would have been seen this year. The same principle will apply to all weeds, even perennials, that can be destroyed by cultivation at all.

Surface Cultivation and Moisture. In various places throughout this article, reference has been made to the practice of keeping the ground-surface stirred in order to conserve the moisture. To find out the actual effect of a soil-mulch on the amount of moisture in

the soil, we conducted last year at the experimental field a trial test on two plots side by side. The one plot was left with a hard smooth surface, and the surface of the other was kept loose and mellow. In all other respects the plots were the same, no crop being grown on either. The exact amount of moisture present was determined for three months in succession. In the month of July, the driest month of the three, the difference between the two plots was greatest. The amount of moisture saved by the surface mulch in the month of July was 37% of the total rainfall for the month. In California, irrigation has to be resorted to to supply moisture for the fruit-trees. On one particular orchard, $2,000 a year is spent in irrigation and surface cultivation, the most of it being for the cultivation. The proprietor claims that he may as well spend money in keeping moisture in the ground as in putting it there, and he finds it more economical and more effective to keep it there, for water is costly at certain seasons in California.

Summary of results achieved by surface cultivation and a systematic rotation of crops :

1. The land is made richer, and better crops are grown. On the farm where this rotation is practised, there was three years ago just enough manure for one-eighth of the farm. This year there is enough for one-fourth. In other words, the total yield has doubled within three years.

2. The land has been rid of weeds.

3. A catch of clover is a sure thing every year, on account of the excellent texture and fertility of the soil.

4. The drainage has been improved by the action of the clover and grass roots in penetrating the subsoil. This last fact does away with the necessity of deep cultivation on any soil but the very heaviest.

5. The fertility is extending to a greater depth. Each successive rotation, at the breaking up of the sod, the plow may be allowed to go deeper than at the previous plowing, on account of the increased fertility of the surface soil. The principle at the beginning was, that it is better to have three inches of good rich soil, than nine inches of comparatively poor soil.

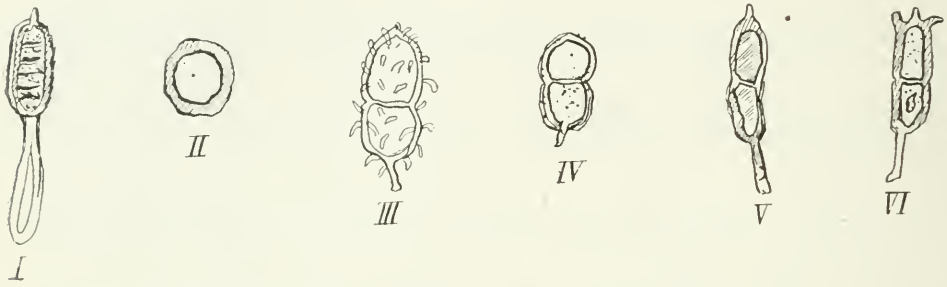
"All our experiments tend to show that it is the physical condition of the soil, its capacity for absorbing and retaining water, its permeability to roots, and its capacity for absorbing and retaining heat, that is of more importance than its chemical composition."—(Sir John Lawes, Chief of the celebrated Rothamasted Experiment Station.)

THE RELATION OF THE BARBERRY TO THE RUST ON CEREALS.

By John Dearness, London.

For several years there has flourished on the farm of Mr. George W. Smibert, near Devizes, Ont., a fine, tall barberry hedge which has served as a fence and as a wind-break for his lane. Its graceful habit, clean foliage, yellow flowers and pendent clusters of scarlet berries persisting through the winter months and awaiting the visits of the returning birds have made it an ornament to his grounds In recent years the cereal crops in the neighborhood have been much blighted with rust, more seriously, it is alleged by some of Mr. Smibert's neighbors, than before the hedge was planted, and thus it fell under grave suspicion and dislike. Discussion in the Legislature and in the public press of a Bill introduced by Mr. Little, M.P.P., for the purpose of exterminating the barberry intensified the feeling against the hedge. An informality was one of the causes which prevented the Bill from becoming law, so the aggrieved farmers had to fall back on persuasion. Mr. Smibert's observations had not led him to the same conclusion as that reached by some of his neighbors; one newspaper to which he applied for enlightenment answered him in effect that theory of the barberry rusting grain is only a prejudice against that beautiful shrub. At any rate, judging that the charges against his hedge were not proven, he was loth to deprive himself of its use and beauty upon the evidence before him. By mutual arrangement a public meeting was held on the 5th of June to discuss the subject at the head of this paper. Mr. Edward Dunn, O.A.C., presided, and addresses were delivered by Messrs. James Bryan, Granton; John Dearness, London, and Councillor Hobbs, St. Ives, followed by a general discussion. Mr. Bryan related his unfavorable experience with a fine barberry hedge. He said that there had been increase of rust on his crops with the growth of the hedge, and diminution of it after he removed the hedge. Mr. Hobbs rather discredited the barberry theory, and gave reasons for attributing the rust largely to the weather. He put in a plea for good husbandry and change of seed. Mr John Dearness reviewed the investigations and researches of recent botanists, and illustrated the life-history with specimens of different species and stages of rust on various kinds of straw, and exhibited preparations of the same under the microscope. The following is a revised report of his address :

What is "rust"? Some people think it is a degenerate or cankerous condition of the tissue of wheat, barley, or other plant upon which its presence is indicated by reddish or black eruptions through the bark of its host, caused chiefly by unsuitable weather or poor nutrition. Any one who takes the trouble to study rust in the right way will soon be convinced that it is a minute, distinct plant with parts of its own analagous to the seed, root, branches, etc., of the plant in which it grows and upon which it feeds. Just as there are different genera of grass plants, such as oats, chess, timothy and maize, so there are different genera of rusts, (over twenty), known in botany as puccinia, phragmidium, uromyces, roestelia, etc.; and further, just as there are different species of each genus of grass—for example, of chess there are smooth chess, corn chess and soft chess—so there are different species of each genus of rust. I have collected over 100 species of rust, most of them on plants that are without economic value.



1. A spore (= a seed) of *Phragmidium subcorticium*, one of the rusts on rose.
2. A spore of *Roestelia* on the fruit of June-berry.
3. A spore of *Puccinia aculeata*, a rust on May-apple.
4. A spore of *Puccinia* on the anemone.
5. A spore of *Puccinia graminis*, common on wheat, oats, rye, etc.
6. A spore of *Puccinia coronata*, often found on oats.

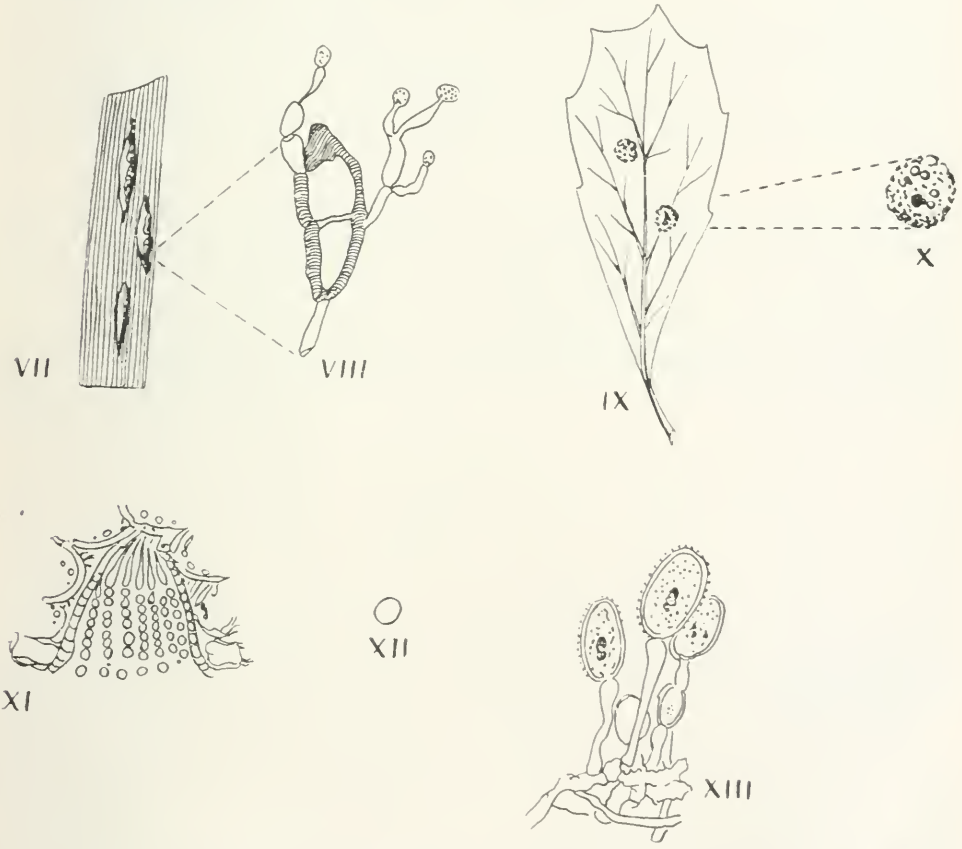
Each of these numerous species of rust has its own kind of seed, called spores, which, if placed in a suitable situation, will germinate and grow in its own way. The germ of wheat-rust will grow in almost any kind of grass, but will not grow in May-apple; and, conversely, the germ of May-apple-rust will not grow in wheat. All these rusts are parasitic, that is, their food consists, not of raw plant-food, but of the organized sap of living green plants. They are like tape-worms, which, living in the digested fluids of their animal host, do not need mouth, stomach or lungs, because they absorb their ready-made nourishment directly through their skins. Another peculiarity of the rusts is that at different stages of their growth they produce different kinds of seeds or spores. Three stages, producing spores which in the mass are usually colored yellow, red and black, respectively, are in some instances so unlike that they have been supposed to be different plants, and have received different names—æcidium, uredo and puccinia—and the spores of these different stages are now spoken of as æcidiospores, uredospores and teleutospores.

But the strangest thing is that in some species one stage grows in one plant, and then by means of its spores it migrates to some other plant to complete its life-history. One stage, for example, of the red apple-leaf rust is in a juniper (the red cedar). Between sixty and seventy species are now known to migrate from one host to another. This sort of migration has its counterpart in the animal kingdom. "Measly" pork is the flesh of the hog affected with the larvæ of tape-worm. If this pork, insufficiently cooked, be eaten by a human being the cysts are dissolved by the gastric fluids and the larvæ are released and attach themselves by their hooks or "suckers" to the walls of the alimentary canal of the eater of the pork. The liver-fluke of the sheep passes through a stage in the tissues of a snail and escaping therefrom on wet grass or in the water of a ditch takes its chance of getting into the mouth and thence to the stomach of a warm blooded animal, for example, a sheep.

Mediæval as well as ancient history contains references to wheat-rust but not even an elementary knowledge of its life-history was possessed by the most learned botanists half a century ago. Some European and British farmers had remarked on the companionship of barberry and wheat-rust, and some of them suspected the relation of cause and effect, but the majority thought the theory unreasonable. In 1864, de Bary, a great German botanist, directed his researches to this subject. He began by inoculating young barberry leaves with the sporids from the black rust of old wheat straw, and obtained the yellow spots with the clusters of cups which had been

known to science as the barberry æcidium. In the next year he proved that with the æcidiospores taken from the barberry leaf he could inoculate wheat and other grass plants with the well-known rust *puccinia graminis*.

The life history of this species of rust as made out by de Bary and frequently verified since is as follows : In the spring the teleutospores, which in the mass look like black streaks on the previous year's wheat-straw, and which are, as seen under the microscope, minute, thick-walled, two-celled spores, germinate by sending out from each cell a fine tube which branches and bears a small number of sporids. One of these sporids carried by the wind and lodging on a leaf of barberry under suitable conditions of temperature and moisture, soon pushes out a small tube which gains access to the tissues of the leaf and therein grows rapidly and makes a network of its branches, called the mycelium. In a couple of weeks a bright yellow spot, one-eighth to a quarter of an inch in diameter, will be visible on the under-side of the leaf. Under the lens, clusters of little open cups may be seen, which are filled with threads of roundish yellow bodies —the æcidiospores. The latter falling on the leaf of a grass plant, under suitable conditions, produces a minute tube which finds its way into the tissue through a breathing pore and begins to form a new branching mycelium. Under favoring circumstances the last mycelium soon begins fruiting copiously, throwing out myriads of oval, rough, red spores—the uredospores. It is mostly by means of these that the rust is distributed. A summer wind may become laden with these spores, and if they lodge in warm wet weather on a field of grain almost every leaf in the field may be inoculated.



7. A bit of wheat-leaf showing three black rust eruptions ; somewhat enlarged. Each of these spots may contain two or three hundred dark brown spores like No. 5, called teleutospores.

8. One of the teleutospores germinating and producing four sporids ; greatly enlarged.

9. The under side of a barberry leaf on which two sporids have germinated and produced round, yellow spots : natural size.

10. A spot enlarged, showing two clusters of three cups.

11. One of the cups greatly enlarged, cut through and showing the strings of æcidiospores.

12. An æcidiospore which, falling on a grass leaf, produces the branching mycelium in the leaf. That in turn will throw off crop after crop of

13. Red, oval uredospores, and finally at the close of the season the crop of black teleutospores shown in numbers five and eight.

The opinion that the eradication of the barberry would give immunity from rust obtained acceptance in some parts of Europe, and the shrub was mercilessly cleared from extensive districts. But still the rust remained. Clearly there were several problems connected with it yet to be worked out. Why do outbreaks appear so suddenly over large areas and not perceptibly worse in the vicinicity of barberry hedges than where such are miles away? Why is it so much more abundant in some seasons than in others? Why do some varieties of grain resist it so much more successfully than others?

Numerous investigators addressed themselves to these problems. De Bary's conclusions were confirmed over and over again, but it was found out that the supposed single species, puccinia graminis, is an aggregate of half a score varietal forms not all of which are equally capable of flourishing on the different varieties of our chief cereal crops. N. A. Cobb proclaimed a discovery, based on his experiments in Australia, that the varying susceptibility of different kinds of wheat is due to the varying thickness of the cuticle, and of the number and arrangement of the breathing pores and to the absence or presence of a waxy bloom on the leaves. Experimenters in other countries failed to verify Cobb's theory of resistance. We have not space to relate the ingenious and exhaustive experiments made by Ericsson in Sweden. These extended over a number of years and included the growing of grains in sterilized soil under glass and in cotton-plugged glass tubes, as well as in varying degrees of exposure to infection. In brief, he reached the conclusion that besides the inoculation of grass-plants by the æcidiospores, rust is propagated by a mixture or blending of the protoplasm of the rust with the protoplasm of the seed.

This theory is capable of explaining the suddenness and generalness of an outbreak of rust. During the whole season the wheat is growing in intimate union with its parasite So long as every circumstance of temperature, wind, and weather is favorable to the wheat-element of the partnership it maintains the ascendancy and under favorable conditions it may go on to ripeness without showing any indication of the rust taint in its blood. But, if on the other hand, conditions favorable to the rust should obtain, such as damp, foggy, sultry weather, then it may gain the ascendancy and reveal its presence by the eruptive lines and masses of spores which it throws out through the cuticle of its host, not only absorbing the sap that should go to develop the grain, but at the same time by clogging the breathing pores depriving its unfortunate host of the air supply necessary to life. It is like a highwayman who robs his victim and strangles him at the same time.

In a summary of the case against the barberry there are some other pleas that should be considered. Puccinia rubigo-vera and puccinia coronata, two species less injurious because less common than puccinia graminis, are both found on our cereal crops; these do not migrate through the barberry. While no one has yet discovered the germination of the sporids of the last named species in any other way than on the barberry, yet it is not demonstrated that that shrub is necessary to its complete life-cycle. The mycelium winters in the tissues of perrennial native and cultivated grasses and mycelial cells are reported to have been found in the bran layers of the seed. The barberry may be to blame for the continuance and renewal of one of the three species of rust that affect cereals in this country, but directly in any one season it is chargeable with only a small fraction of the damage. If every barberry bush in Ontario were burned, the following year, other things being equal, would probably show a scarcely perceptible diminution of rust.

The enormous damage caused by rust, amounting annually to many millions of dollars, might be ameliorated by the following measures: The suppression of the barberry in rural districts, the more complete rotting of rusty straw, perfect drainage of the soil, timely sowing of the seed, rotation of crops and attention to all the conditions of culture that produce optimum growth, and lastly sowing varieties of grain that are reputed to be insusceptible to rust, and, if possible, buying these from farmers whose straw is bright and clean.

POTATOES AND HOW TO GROW THEM.

By J. S. Woodward, Lockport, N.Y.

Although the same amount of nutrition costs much more in the potato than in almost any other form, still people will have it, and on many farmers' tables this forms a large portion of nearly every meal.

Chemists tell us that 82½ per cent. is water and waste matter, and over 15 of the remaining 17½ is starch. Still the hardy son of Erin swings the pick and handles the shovel daily on a diet made up largely of potatoes. People will pay one cent a pound for potatoes in competition with beans at less than double that price when the pound of beans contains more than five times as much nutriment, and that much better balanced.

But there is one thing greatly in favor of the potato as a farm crop: it contains a very large proportion of water and starch, neither having any manurial value and but very little of the costly elements which must be maintained in all productive soils. And so long as consumers consult taste, instead of economy, in the buying of foods and are willing to pay such prices for that which detracts so little from the soil, the wise farmer will provide them with all they want and of a quality that will stimulate the demand.

Soil. The potato will grow and produce good crops on a great variety of soils, providing they are rich and not too wet during the growing season. On a reclaimed muck a large crop of smooth, handsome tubers will be grown but they will not have as good a quality as those on soils with less humus and more of the mineral elements, particularly potash. An ideal potato soil is a light friable sandy loam, rich in potash and with plenty of vegetable mold. Such a soil will not only give a maximum yield of tubers, but they will be of the highest quality and, in a discriminating market, will sell for several cents per bushel over those from any other kind of land; still no farmer should fail to grow an abundance for his family use.

Manuring. While a virgin soil will produce an immense crop with no manure, there are now but few fields so rich that it will not pay liberally to apply a generous amount of manure. It is a bad practice, however, to apply stable manures directly to this crop, even though it be put on the previous fall. Such an application even if it does not cause them to be scabby will cause a depreciation of quality.

The best way is to manure the sod in the fall and winter, with no fear of putting on too much; plant with corn, and follow next year with potatoes. On most soils, even with this preliminary heavy manuring, it will pay to use from 250 to 1,000 pounds per acre of a special manure rich in potash. I have used as high as 1,500 pounds per acre of the following and the increased yield paid well for the extra fertilizer:

400	pounds	muriate potash.
250	"	nitrate soda.
300	"	dried blood.
500	"	bone flour, very fine.
400	"	plaster.
150	"	salt. All mixed.

This will make a fertilizer containing 4 per cent. nitrogen, 7½ per cent phosphoric acid, and 10 per cent. actual potash, and is a very good formula for the potato.

Preparation of the Soil. With a soil rich and well covered with clover it may be plowed so as to turn all the clover under and fitted and planted to potatoes with almost a certainty of a good crop. Such a clover crop would have in a very available form all the elements necessary for a yield of 200 bushels of potatoes except the potash and 200 pounds of muriate of potash would supply the deficiency. But as already said the ideal preparation is to manure this clover heavily for corn. Let it grow in spring as long as possible before turning it down. Give the corn very clean culture and the following spring plow and plant to potatoes. In this way the manure applied will have so far rotted as to obviate all danger of scab, and the clover will have become so thoroughly incorporated with the soil and furnish so much humus, that with the added fertilizer, as indicated, a big crop may certainly be expected and of the finest quality. If the corn be properly cultivated the weeds will be so fully killed as to make it but an easy matter to keep the potatoes clean.

Seed and Planting. Doubtless to plant whole potatoes of good size will ensure a larger yield and earlier maturing of the crop, but this will also be likely to show a larger proportion of small potatoes, and on the whole it is very doubtful if the increase in product or the gain in earliness will pay for the extra seed and labor in planting.

I like to use "pedigree" seed. To obtain such, I select model potatoes of the variety to be grown, and plant such a sized plot as will give the desired amount of seed, and on these plots each year I mark the model hills from which to select seed for the *pedigree plot* the following year. From the crop of this plot I take my seed for the main crop. I would prefer the smallest potatoes from these to the best ones to be found in the general storage bins.

If using potatoes for seed of the size of hens' eggs and smaller I would not cut them; if larger, I cut to about this size, paying more attention to uniformity of size than number of eyes on the piece. In practice, I find the yield is more largely due to what is in the ground under and about the hill than the quantity of seed planted in the hill. While owning a planter, I do not use it. It does not get the seed deep enough in the ground to please me.

There is much discussion as to which is best, hill or drill planting. I have tried both ways and carefully compared the labor of tending the crops and product, and I am sure that I can grow more potatoes to the acre, and of a more uniform size, with less labor if I put them in drills. When the ground has been well fitted, with a one-horse plow, open a furrow at least four inches deep *and straight*. Drop the potatoes in this from twelve to eighteen inches apart, according to their habit of growth; as a rule, the ranker the growth the further apart they should be placed, though the Rural New Yorker No. 2 is an exception to the rule, for while it is one of the rankest growers it must be planted close or the tubers will be too large and of poor quality.

After dropping, reverse the plow and turn as heavy a furrow as possible over the potatoes. Four good active droppers will keep a horse busy opening furrows and covering potatoes, by having one furrow opened ahead and starting from the same end as at first. The second one may be opened and going back the first one be covered, and in this way only one furrow will be opened at a time, and each row will be covered by plowing back the furrow made in opening. This is very important in hot, dry weather, for if the seed is left too long in the hot sun it is apt to be injured, or wholly destroyed.

Cultivation. "A stitch in time saves nine," is as true in the potato field as anywhere else. The easiest time to kill weeds is before there are any to kill. Consequently, when the potatoes have been planted a week, the ground should be harrowed crosswise of the rows. There is no better implement for this than a good spring-tooth harrow, if the teeth be set so as not to go more than three or four inches deep. The potatoes should be carefully watched, and when they are just large enough to be almost up, if the land is level, they should be harrowed again, this time diagonally over the field and with a slanthing-teoth smoothing harrow. Every weed will have been killed up to this time and the ground left as fine as a garden. I like to harrow them once or twice after they are up, going lengthwise the row and using a light smoothing harrow. If the soil is not too hard, a weeder will do good work, though I like the harrow better if it be light and the teeth be set so slanting as not to catch on stones or sods. By the persistent use of the harrow up to the time the potatoes are six inches high, the weeds will be so entirely destroyed, and the tops will so quickly shade the ground that hand hoeing will be unnecessary. If they are scuffled three times after the harrowing is finished they will be kept entirely clean.

All cultivation after the first time through should be extremely shallow, not more than two inches deep. It is advisable to run through them after every heavy rain, scarifying the surface, so as to keep them mulched with loose earth just as long as it can be done without breaking the vines.

Insects and Disease. In the warfare with these, as in that with the weeds, it pays to be in possession of the field. If we kill the first crop of bugs we will have but little trouble after, but if we let the first get full grown and go into hibernation we shall have an all summer fight on hand. I have found it a paying plan to cut some old potatoes pretty fine and dip them in a strong solution of Paris green and scatter them about as soon as the potatoes are planted. If this treatment be followed and renewed two or three times before the crop comes up, thousands of old bugs will be poisoned. Then the early planted potatoes should be carefully watched and sprayed, or dusted with poison as often as necessary to kill the first crop. I have used numerous of the insecticides, but have never found any that I preferred to Paris green, if a pure article be used. It can be put on with a dry powder gun if mixed with flour or plaster, but I prefer to put it on in connection with the Bordeaux mixture. I use at the rate of one pound to 100 gallons of the mixture, as I find that with less than this amount I do not always kill.

Often we suffer more damage from the little potato flea beetle than from the Colorado bug, but the persistent use of the Bordeaux mixture is quite effectual in preventing injury from these. One of the worst things the potato grower has to dread is an attack of the late blight. It is not every year that it materially damages the crop, but when it does come, and with the right kind

of weather, every chance of profit is quickly ruined. While spraying will not always prevent this, in ordinary years it will so protect the crop that the blight will do but little harm.

Spraying is not only a preventive of blight, but nothing will do more to ward off the attacks of the flee beetles, so it pays. If the vines be sprayed when about one foot high and sprayed each ten days for three or four times, we shall add from 50 to 100 per cent. to the yield. I use Bordeaux of the proportion of one pound copper sulphate to ten gallons of water, with lime enough to neutralize the sulphate, say one pound ; to this I add the poison.

Digging and Picking up. Where a large crop is raised a good digger will pay, but it is not every one who has enough to justify the expense of a digger. I have found that it greatly facilitated the digging to go each side of the row with a one-horse plow, running as close to the hills as possible and throwing the furrow to the middle of the row. A man can follow with a hook and pull them out very rapidly.

In picking up, it pays to have a lot of crates scattered along by the side of the field and let each person pick into a half-bushel handled basket. When nearly full it can be emptied into the nearest crate. When these crates are filled they should be set upon a platform wagon or into a wagon box and taken directly to the cellar or pit to be emptied, and thus save the extra shovelling or picking up.

Selling or Storing. As a rule it pays better to sell in the fall than to store till spring. There will be a great many potatoes as they come from the hill just large enough to go, which if kept till spring, even in the best of storage, will have so shrunken as to be unsaleable, and then all will have so seasoned out and shrunken in size and weight that a difference of 15 or more cents per bushel would not make up the loss, to say nothing of the extra labor involved in pitting or handling; more than is necessary when marketing is conducted straight from the field.

But when they are stored, as will be sometimes necessary, they should be kept in a dry dark place at as near 40 degrees F. as possible. There is no way in which they will keep in better condition than in pits, but here they must be ventilated until they are dry and then protected from frost. A dark, dry, cool cellar answers very well, but it must not be forgotten that light is very injurious to the eating quality of the potato, and therefore the darker the storing place the better.

Scabby Potatoes. This is a serious malady with which the potato grower has to contend. No matter how large the yield or how good the quality a very little amount of scab will take all the profit out of the crop. There is no doubt but its prevalence depends much upon the season, but some soils are so filled with the spores that no matter how clean the seed may be, or what preventive measures may be used clean potatoes cannot be grown on it. If scabby seed be planted in soils free from the spores, scabby potatoes will not always be grown, but the danger is so great that seed affected with scab should not be planted without being treated.

That the soaking of the seed in a solution of corrosive sublimate or formaldehyde will kill the germs of scab, no one who has studied the matter or made experiments doubts. But the treating of the tubers will not at all prevent scab if they are planted in soil filled with spores.

One cannot be too careful when feeding scabby potatoes to any kind of stock to see to it that none of the manure made be put upon land on which it is proposed to raise potatoes, for several years. It is but little trouble to soak the seed potatoes. A stock solution of corrosive sublimate should be made by dissolving two ounces in a couple of gallons of hot water and then adding 13 gallons more so as to make two ounces to 15 gallons. A barrel can then be filled with potatoes and enough of the solution be dipped in to cover them. Let them soak one and one-half hours, then pour or draw off the solution and empty the potatoes and refill the barrel, when the solution can be returned and enough more put in to cover the potatoes, and this can be repeated until all have been treated. After the potatoes have been treated they can be cut and planted immediately, or at any convenient time, only they should not be put into baskets or boxes in which untreated potatoes have been handled.

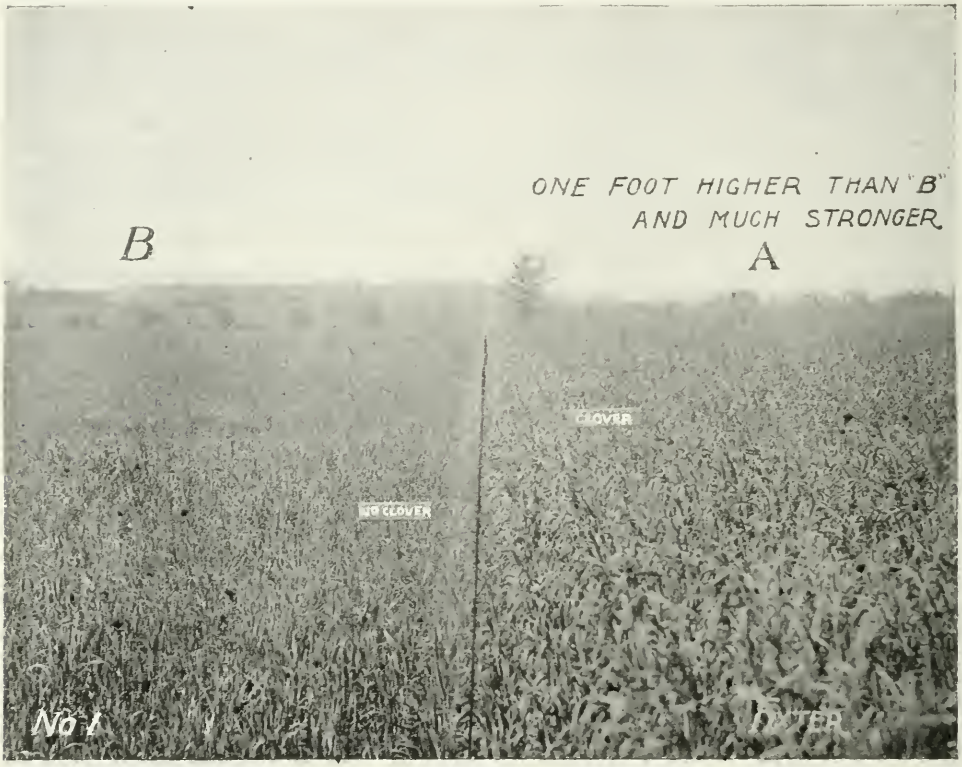
No one should forget when using this solution its very poisonous nature, and be careless in leaving it so that any animals can drink it or eat the potatoes after treatment.

Any man who goes into the growing of potatoes as a money crop must expect to have an occasional year when he will be happy if he gets out whole, but if he sticks to the business for five or ten years he will be all right with a good balance on the right side of the ledger.

CLOVER AS A FERTILIZER AND FODDER.

By John Fixter, Ottawa.

The benefits derived from the growing of clover as a fertilizer and fodder warrant me in advising every farmer to sow clover with each grain crop he grows, excepting peas, and the following methods, if adopted, will undoubtedly give interesting and profitable results :



No. 1. (A) Bavarian Oats on July 4th on land where clover was plowed under in spring.
(B) Bavarian Oats on land where Brome Grass was plowed under in spring.
Oats after clover were 20 inches taller July 4th than on land where there was no clover.

Preparation of the Soil. Plow in the autumn, according to the depth of your land ; if the soil is only four inches deep, plow to that depth ; if the soil is good, I would prefer to go down eight inches, but do not turn the poor soil up on the surface. In the spring prepare the soil with a disc harrow or cultivator, and thoroughly harrow with a smoothing harrow before sowing ; in all cases make a good fine seed bed, as clover seed is so small that much would be lost in a rough, lumpy field. All seed should be carefully selected, and thoroughly examined to see that it contains no weed seeds. The germinating power of the seed should also be tested before sowing. Should the soil be so run down as to render a catch of clover difficult, either of the following methods, if adopted, will greatly assist in securing a good catch :

1. Sow very early in the spring.
2. An application of wood-ashes at the rate of about 100 bushels to the acre.
3. An application of kainit at the rate of about 400 lbs. to the acre,

   An application of superphosphate at the rate of 200 lbs. to the acre.

Method of Sowing. Sow the clover seed at the same time as the grain is sown by means of a grass-seed attachment fastened behind the seed box. This will allow the clover seed to drop in the grooves made by the grain drill which will prevent them from being covered too deeply. Also, the clover seed coming in contact with the moist earth will render the conditions for germination more favorable. A heavy land roller should be passed over the land immediately after the seed is sown, running in the same direction as the seed drill.

(A.) *Crop of Bavarian Oats, 1899.* In the spring of 1897 this land had been sown with barley and a grass mixture containing clover seed. In 1898, two crops of hay were taken off; sod ploughed under in spring of 1899.

(B.) *Crop of Bavarian Oats, 1899, from plot adjoining* and of uniform size with (A.). The grass mixture sown in 1897 was the same as that on (A.), with the exception that it did not contain any clover.

Since the land on (A.) and (B.) had received the same treatment, with the exception noted above, the much larger yield of oats on (A.), as apparent from the photograph must be due to the fertilizing effect of the clover.

The Quantity of Seed to Sow. On heavy sandy loam in good tilth, from eight to ten lbs. to the acre; on light sandy loam in poor tilth, from ten to twelve lbs to the acre; on heavy clay land, when lumpy or rough, it requires more seed to the acre. Many failures to grow this valuable crop are due to insufficient seed, not sowing at the proper time and in the right manner.

A comparison of the figures in the following tables will show the great differences in the amounts of available material of roots and stems when plowed under in the autumn, after six months' growth, and when turned under the following spring, for corn, potatoes or turnips. An area 4ft. by 4ft. in each plot was dug to a depth of nine inches, and all the roots and tops carefully gathered and weighed, and from the weights of the material gathered were calculated the estimated weights per acre. All plots were sown with Mensury barley:

	6 months after seeding.		12 months after seeding.	
	Dug Nov. 5.		Dug May 21.	
Mensury Barley, with 4 lbs. Mammoth Red Clover Seed per acre.	tons.	lbs.	tons.	lbs.
Weight of Clover leaves and stems per acre	2	1,189	6	1,442
" roots per acre	2	934	6	1,783
Total	5	123	13	1,225
Mensury Barley with 6 lbs. Mammoth Red Clover Seed per acre.				
Weight of Clover leaves and stems per acre	2	764	7	1,484
" roots per acre	2	1,870	5	1,741
Total	5	634	13	1,225
Mensury Barley, with 8 lbs. Mammoth Red Clover Seed per acre.				
Weight of Clover leaves and stems per acre	2	1,785	8	1,356
" roots per acre	2	1,870	6	1,783
Total	5	1,655	15	1,139
Mensury Barley, with 10 lbs. Mammoth Red Clover Seed per acre.				
Weight of Clover leaves and stems per acre	3	806	9	887
" roots per acre	3	456	7	633
Total	6	1,262	16	1,520
Mensury Barley, with 12 lbs. Mammoth Red Clover Seed per acre.				
Weight of Clover leaves and stems	3	551	8	1,356
" roots per acre	3	210	6	1,272
Total	6	761	15	628
Mensury Barley, with 14 lbs. Mammoth Red Clover Seed per acre.				
Weight of Clover leaves and stems	3	380	8	845
" roots per acre	3	1,486	4	1,358
Total	6	1,866	13	203
Mensury Barley, with 10 lbs. Common Red Clover Seed per acre.				
Weight of Clover leaves and stems per acre	2	1,955	9	717
" roots per acre	2	1,615	6	421
Total	5	1,570	15	1,138
Mensury Barley, with 6 lbs. Alsike Clover Seed per acre.				
Weight of Clover leaves and stems per acre	2	509	11	631
" roots per acre	2	1,615	4	1,018
Total	5	124	15	1,649
Mensury Barley, with 14 lbs. Alfalfa Clover Seed per acre.				
Weight of Clover leaves and stems	1	892	3	816
" roots per acre	1	41	2	254
Total	2	933	5	1,070

No. 3. (A) Crop on land second year after clover seed was sown in the spring and plowed under in the autumn of the same year.
(B) Crop on an equal area of land not so treated, seen on the right of path.

Clover plots gave 53 bush. 13 lbs. per acre of grain and 2,872½ lbs. straw, while plots on which clover had not been sown gave 41 bush. 6 lbs. of grain and 2,125 lbs. straw, a difference of 12 bush. 7 lbs. of grain and 747½ lbs. of straw in favor of clover plots.

The above figures are worthy of a very careful consideration. Even if only half the above weights are secured, it will well repay the extra expenditure of time and money in sowing clover seed with grain crops. Some may be under the impression that sowing such quantities of clover seed with the grain will lessen the yield of the latter. This will not be the case, as has been demonstrated by experiments made expressly to ascertain this point. We have also found clover of great benefit in covering the land and choking out weeds. Another advantage in sowing clover is that it keeps the land covered after the harvest and ensures a grand pasture for late summer and autumn, if desired

Some very interesting experiments were instituted in 1897, to ascertain the advantages of sowing clover with grain in the spring to be turned under the following autumn. Two plots of wheat, two of oats, and four of barley were sown, and on each alternate plot clover seed was sown at the rate of ten pounds to the acre. In the autumn the land was plowed about eight inches deep, and the following spring disc harrowed, and harrowed well with the smoothing harrow before sowing. In 1898 the plots were all sown with Banner oats. The four plots which had clover sown with the grain in 1897 gave an average of over eleven bushels of oats per acre more than those plots which had been sown with grain only. They also gave an average of over one and a half tons of straw per acre more in favor of the clover sown plots. Cut No. 3 represents the same land with yield of 1899—no other. Another series of experiments were commenced at the same time as the above mentioned, in order to ascertain the advantages of allowing the clover to remain on the land during winter and to be turned under the following spring. In this case the plots were sown with barley and different quantities of clover seed, three check plots being sown with barley only. On the 23rd May, 1898, at which time the clover had made a heavy growth, all the plots were plowed to a depth of six inches, and harrowed well before sowing with corn. The variety of corn sown on all the plots was the same, namely, Longfellow, which was sown May 25th, 1898, and cut September 15th, 1898.

The results obtained may be tabulated as follows ;

	Yield per acre 1898.	
	tons.	lbs.
Barley, with 4 lbs. Mammoth Red Clover per acre, sown spring, 1897	15	560
" 6 lbs. " " " "	15	1,720
" 8 lbs. " " " "	15	1,440
Check plot, barley, spring 1897, no clover	13	160
Barley, with 10 lbs. Mammoth Red Clover per acre, sown spring, 1897	15	1,360
" 12 lbs. " " " "	16	1,920
" 14 lbs. " " " "	17	1,860
Check plot, Barley, spring 1897, no clover	14	960
Barley, with 10 lbs. Common Red Clover per acre, sown spring, 1897	22	200
Barley, with 6 lbs. Alsike Clover per acre, sown spring, 1897	15	640
Barley, with 14 lbs. Alfalfa Clover per acre, sown spring, 1897	14	1,320
Check plot, Barley, spring 1897, no clover	13	280
Barley, with 6 lbs. Alsike Clover and 14 lbs. Orchard Grass per acre, sown spring, 1897	19	200
Barley, with 6 lbs. Alfalfa Clover and 14 lbs. Orchard Grass per acre, sown spring, 1897	14	1,280

Pasturing. In pasturing, the method generally adopted by our farmers is to take two or three crops of hay off a field, and then put the cattle on for a year or two, under the impression that by so doing they are giving the land a rest or making it up. In my opinion, such a system is anything but economical. I would advise pasturing the new meadow the first year and taking a crop of hay off the second year. Sow plenty of seed, in order to secure a solid mat, and for this purpose I would recommend the following mixture :

Timothy, 6 lbs.	Orchard Grass, 6 lbs.
Common Red Clover, 6 lbs.	Alsike Clover, 2 lbs.

to the acre.

This may seem a heavy sowing, but the returns will more than repay for the extra seed. Besides with such a mat as would be produced by sowing the above quantity of seed, there would be no danger of the cattle injuring the meadow to any appreciable extent by tramping. There have been more failures from sowing too little seed than from sowing too much. Should the clover be winter-killed its decaying roots will supply plant food for the Timothy and Orchard Grass; the two latter, seldom if ever, being winter-killed the first year. In the spring, allow

the clover and grass to become well established before putting the cattle on. By running the cattle on the first year, the difficulty of saving heavy crops of clover will be overcome ; also, the trouble of pastures running out in June, and thus necessitating the growing of mixed crops or corn for feed, when, if this method is adopted, the new meadows will be growing and green, and two cows may be safely put on an area of land which would not sustain one cow if the method now practised by many of the farmers is adopted. If it is not desired to take a crop of hay off the second year, this is by far the best system of pasturing, as the farmer will enrich his land by turning the clover or sod under as a fertilizer ; it the land is to be used for corn the following year, plow under in the fall, so as to allow of early sowing in the spring ; if corn, roots or potatoes are to be sown, plow under the following spring. It it desired to leave the field for hay the second year, in late autumn or early spring, pass the harrow over the field to break up any manure lumps which are likely to interfere with the mower. I would also advise rolling the land with a heavy land roller in the spring ; as early as the horses will not pouch the soil Do not allow the meadow to remain down over three years for seeding—two years is preferable.

The best returns are obtained when the meadows are not left longer than two years.

DAIRYING DEPARTMENT.

THE LATEST DISCOVERIES IN THE TREATMENT OF PARTURIENT APOPLEXY (MILK FEVER).

The enormous fatality among parturient apoplexy patients coupled with the unrelaxing demands upon the diary cow has forced the more enquiring minds into greater and untiring activity with the result that the most encouraging reports come from the results of a treatment advanced by a Danish veterinarian, Schmidt Von Kolding. Heretofore the veterinarian's attention has been directed to the uterus, (womb), as being the medium through which the poison was admitted to the circulation and carried to its seat of operation (great nerve centres) where its death-dealing depression was exhibited, and although very vigorous efforts were pursued to combat it, its further introduction into the system, and counteract the evil effects produced, the results attained were at best most unsatisfactory and discouraging.

Without attempting to enter upon lengthy details regarding the malady, we may state that the result of the new Schmidt treatment coupled with close observation along experimental lines has demonstrated beyond all doubt that the udder is the true origin and seat of the disease. Decomposition of the secreting cells in that organ when the milk secretion begins, immediately after calving. A leucomaine, (depressent poision), being formed from the cholesterin bodies and rapidly absorbed into the circulation is the direct cause of the disease. How and why Prof. Von Kolding turned his attention to the udder we are not told, but since attention has been thus directed, various interesting and highly instructive experiments have been tried and it has been clearly demonstrated that decomposing milk injected into the udder at any time, produces within from twelve to thirty-six hours conditions identical with those of milk fever in the usual way, and post-mortem examinations point out almost identical abnormalities with that of milk fever, especially when the duration of sickness has been brief, proving conclusively that milk fever can be induced.

Treatment and Mode of Application. As the symptoms of a well-marked case of milk fever are already well known to experienced dairymen we deem it unnecessary to repeat them fully. When a good milking cow in high flesh just before or soon after calving becomes restless, paddles with her hind feet, lies down and rises with difficulty, the udder becomes soft and flabby, it is time to become suspicious that all is not right and immediate action should be taken. The herdsman, already provided with a liberal quantity (3 sixty-grain doses) of potassium iodide, carbolic acid and udder syringe of proper design, procures a liberal supply of freshly boiled water. The udder and teats should first be well bathed with warm water to which has been added a tablespoonful of carbolic acid to each quart. All milk should be drawn from the udder and one drachm (60 grains) of potassium iodide should be disolved in one quart of hot water, (freshly boiled), with one dram carbolic acid and injected into the udder through the teats—an equal amount into each teat. The patient should be kept dry, warm and free from excitement or noise, and in no consideration should drenching be done so long as any acute symptoms are present. The patient should be turned from side to side every four hours, taking care to avoid injuring the udder, and the udder injection given again in six hours, if signs of return to consciousness are not present.

In the hands of European veterinarians reports come to the effect that ninety per cent. of 412 cases so treated made complete recovery, and in Canada, to the writer's knowledge, fifteen out of seventeen cases came through to complete recovery, with the possible exception of slight irritation in the udder, due probably as much to external injury as to the irritating properties of the treatment, all of which became normal within the reasonable period of a few days. Various doses were experimented with, varying from one half to two drachms of the drug, and although the smaller dose was repeated at shorter intervals the one drachm doses gave best results, while a double amount produced alarming symptoms and did not appear to exert any more favorable influence over one-half the quantity, which appears perfectly safe.

How does Potassium Exert Its Influence in Such Cases? Long before potassium iodine was associated in this way in the treatment of milk fever it was a well established fact that it exerted a stimulating influence upon the base of the brain and great nerve trunks when administered in large doses, and it is in this action that it counteracts the depression present in that malady. It also, no doubt, arrests the decomposition in the udder (having antiseptic properties) when brought into direct contact with it (udder content.) Having a powerfully stimulating effect upon the lymphatic glands, it also hastens the elimination from the system of the offending poison, hastening recovery.

Form of Instrument Most Suitable for Its Application. Various instruments have been recommended for the application of the udder injection, but the instrument portrayed in the accompanying cuts seems to fill the greatest number of requisites with fewer objectionable features than any other we have seen. (See cut A.) The large glass bottle, No. I, holds the required amount (half pint) for one quarter (one teat.) This bottle can easily be cleansed. It can be brought to the proper temperature by immersing in hot water for a few minutes previous to its use. The rubber tube (2) is connected over the end of a glass tube which runs to the bottom of a glass bottle (No. 1.), thus minimizing the danger of air being pumped into the udder with the solution. The remaining portion of the instrument consists of a bulb syringe (Fig. 3) to which is attached a milking tube (4) which can readily be detached for the purpose of cleaning, previous to inserting the silver tube into the teat. The bottle, (No. 1), should be filled with the prepared solution at 102 degrees F. and the syringe pumped full, which also forces out the air, and as soon as the contents of the bottle No. 1 is emptied the operation of the bulb should cease, so as to avoid the introduction of air into the udder, as air hastens decomposition and thus delays recovery. Great caution is also necessary to avoid the introduction of foreign substances, hay-seeds, etc., which may drop into the vessel containing the medicine, as such will produce damaging results upon the udder. Everything must be kept scrupulously clean to secure the best results. Cut B. shows the instrument in actual use with the tube inserted into the teat and shown in the correct position in the hands of the operator.

AGRICULTURE AND DAIRYING IN SCOTLAND.

By John C. Higgins, Dundee, Scotland.

The agricultural difficulties caused by the drop in prices, which in Great Britain may be stated roughly as amounting to about thirty-three per cent. within the last twenty years, have in the main been met by one of two methods—(*a*) reduction in expenses, (*b*) increase of production. Speaking broadly and subject to individual exceptions, it may be said that the first method has been chiefly resorted to in England and the second in Scotland. The former has been effected chiefly by laying down land in grass for the purpose of grazing with cattle or pasturing with sheep. A very large acreage of the country has been thus treated. In some instances the land has been simply left to cover itself, first with weeds, and by degrees with grasses indigenous to the locality. This process is of course the least costly of all, but it yields no return for a number of years, and only a small one at last. It has therefore been resorted to in exceptional and rare cases only. More generally the land has received more or less of cleaning and preparation, and seeds of good and permanent grasses have been sown, usually along with a grain crop. Great improvement has of late years been attained in getting such seeds pure and with a good percentage of germination. Most of the leading seedsmen now guarantee their seeds to be within one to five per cent. of absolute purity; and the percentage of germination is also guaranteed, though it varies to a greater extent, being generally about ninety. though with a few species it is as low as seventy or eighty. The expense of such seed, however, is considerable, varying from $5 to $10 per acre. But even with the utmost care, and with no stint of expenditure, it generally takes from five to ten years to establish what (in England especially) is considered a good pasture, that is, one which will fatten cattle at the rate of about

one beast per acre during the summer. In the majority of cases even this will not be attained without the addition of from three to six pounds of linseed or other oil-cake per day. But subject to this outlay, and the expense of maintaining fences, the system of grazing on grass once established involves extremely little expense and yields returns which may vary from $5 to $15 per acre according to the character of the land.

Methods of Meeting Low Prices. The economy, however, is obtained entirely from the cessation from employing labor. This means that laborers are displaced from the country districts and forced to migrate to the towns. The system is, therefore one hostile to the interests of the nation at large. It has, in fact, always been viewed with disfavor by the English people, and statutes as far back as the Tudors were passed for the purpose of restraining the practice of converting arable land into grass. The other method of meeting low prices has consisted in endeavoring to increase the production from cultivated crops, at the same time cultivating such only as give the best returns. This method necessarily tends to employment of more rather than of less labor on the land, for it involves higher cultivation, the use of more manure, and the handling of larger bulk of crops. Nor, with the exception of mowing and reaping machines, has it been found possible to substitute, to any material extent, machinery for human (and horse) labor. The chief alterations introduced in carrying out this system are the feeding of cattle in winter under cover, and the increased use of commercial manures Formerly cattle, though they had the option of a covered shed, were in winter generally kept in yards or courts, of which a great part was without any roof. It was even believed that they throve better with this degree of exposure to the weather. But one consequence was that a large proportion of their manure was leached and rendered comparatively worthless. This system still survives in England, but it is nearly extinct in Scotland. In this country almost all farms have now their cattle yards entirely roofed over. The manure is thus doubled in value, and the cattle fatten much more quickly and at less outlay for food.

Food and Feeding. In addition to the foods produced on the farm, it is also the universal practice to give all cattle, which are in the fattening stage, from four to five pounds a day of oil-cake, or meal of some sort of grain. This also greatly enhances the value of the manure. The cost of such foods has fallen considerably. Linseed cake, which cost at one time $60 or more per ton, is now only from $30 to $40. American maize and Asiatic barley cost only $20 to $25 per ton. The use of these more concentrated foods permits the straw grown on the farm to be used for feeding, and thus utilizes a part of the crop which was formerly considered merely as waste, or at least only good for litter. By cutting the straw into "chaff," *i.e.*, short pieces of one-half inch in length, and mixing it with the meal used for food, a value equal to $7.50 to $10 a ton is obtained from it in feeding. This is obviously an important addition to the profits of the farm. But in Scotland, especially, a great deal of the oat straw has always been, and still is, consumed without being chopped, and it is reckoned as not greatly inferior to hay.

It should be kept in view that the feeding of cattle, and partly also of sheep, in the winter is an essential element of husbandry in all parts of Great Britain. On the poorest lands young stock, or "stores," are alone raised or kept without any attempt to fatten. On medium lands both classes, and on the richest lands cattle for fattening only are kept. The reasons are found, firstly, in the actual profits made in using hay, straw, or roots for growth and fattening; and, secondly in the production of manure for subsequent crops. In connection with this system what are called "green crops"—that is, mangel wurzels, in the south and middle districts of England, replaced by turnips in the north and in Scotland—are a regular crop in the rotation. These have come in the place of the old fallow when the land was allowed to lie without any crop during the whole summer, in order that by frequent cultivation weeds might be extirpated and fertility increased. These objects are now attained by the large amount of cultivation given to the green crops, which begins in spring and is carried on till they quite cover the ground in July, and by the heavy manuring always given to them. This in the first place produces a crop varying from twelve to thirty tons per acre, and at the same time the land is left clean and enriched, so that it yields a subsequent crop of oats or barley, followed generally by clover or grass without further manure, or only with a dressing of commercial manure. These green crops being consumed by cattle in the yards or by sheep penned upon them, furnish the manure for next year.

Manures and Manuring. This manure is, however, in Scotland largely supplemented by commercial manures. That most in use is phosphate of lime, either in the form of superphosphate, basic slag, or bone-meal; and this is principally applied to the turnips and potato crops at the rate of about three hundredweight to the latter, and three to six hundredweight to the former per acre. One or two hundredweight of nitrate of soda or sulphate of ammonia is generally added. A hundredweight of either of the two latter, with two hundredweight of superphosphate, is frequently used as a top dressing for the grain crops in the spring or upon

grass intended to be cut for hay. Potassic manures, chiefly kainit, are used to the extent of three or four hundredweight per acre for potatoes, but rarely for other crops.

It must be remembered that the manure of the animals fed on the farm, which contains the manurial residue of much cake and meal, and is wholly kept under cover till applied to the land, is of high value. It is carted, spread and plowed under in autumn, in winter or in spring according as weather or work permits. No difference is perceived in results arising from the time of application.

Agricultural Practices in Fifeshire County, Scotland. I have, while resident at Dundee, had an opportunity of observing the general application of the system above described in the highly cultivated adjacent counties of Forfar and Fife, more minutely in the latter. Upon the North Sea between the Firths of Tay and Fourth, for a distance of nearly forty miles, lies Fifeshire, one of the most fertile and not the least picturesque of the counties of Scotland. I have had on several occasions the advantage of going closely over one estate under the guidance of its owner, and I can perhaps best illustrate the special characteristics of the best Scottish farming if I give in some detail an account of the practice which I there saw in operation. One mile from Collessie brings us to the park entrance of Kinloch, the residence of J. Boyd Kinnear, Esq., M.P., author, agriculturist and country gentleman. One hundred acres of park, of stately trees, winding roads and shaven turf; walled gardens with the usual wealth of flowers, fruit and vegetables; and parterres and turf immediately around the house make Kinloch as charming a place as can be seen even in this land of homes. The present proprietor devoted the earlier years of his life to the practice of the legal profession and to journalism in London. But his health having given way under the pressure of these exacting pursuits, he was obliged under medical advice to abandon them entirely, and from 1870 to 1884 he lived almost entirely in the island of Guernsey. This accident led him to an acquaintance with the breed of cows of that island, and being compelled, on succeeding his father in the Fife estate, to take a considerable part of it out of the hands of the tenants, who were unable to contend against the fall of agricultural prices, he resolved to have recourse to milk production from a herd of imported Guernsey cows, chiefly of his own selection, as the best means of meeting the difficulty. Through the kindness of Mr. Kinnear I am enabled to furnish the Department with the following particulars as to his methods and practice in handling this beautiful and profitable estate.

Establishing a Guernsey Herd at Kinloch. Mr. Kinnear in farming adopts the system of cropping already described as prevailing in Scotland, as a basis, but modifies or extends it to meet his special requirements. His live stock consists of a herd of (at present) about 120 pedigreed Guernsey cows, with some sixty or more or their produce in various stages of growth. For the disposal of the milk without risk of adulteration by middlemen, he has two stores of his own, one in the small town of St. Andrews, containing a population of about 6,000, and the other in Edinburgh, the capital of Scotland. The former is distant by rail about twenty miles, the latter about fifty miles. In the former the milk is retailed at eight and in the latter at ten cents per quart. The whole expense of the stores, of distribution, and of carriage, are of course to be deducted from these prices. They are, in each case, about two cents per quart higher than the rates current in the respective towns for ordinary milk The demand for his milk is generally so large as to absorb nearly the whole supply, therefore butter is made only from such small surplus quantities as may not be required, and it is scarcely a regular product of the dairy. At certain seasons, however, when the demand falls off through the occurrence of vacations of schools or the departure of customers on visits or to country quarters, he makes a considerable quantity both of butter and of cheese, and the latter, being made from the whole milk, is very rich and sells readily at from 18 to 24 cents per pound. About eight pounds of milk suffice to make one pound of cheese.

Feed of Cows during Summer. The cows feed during summer—that is, from the middle or end of April (according to the season) to the middle or end of October—chiefly on pasture which consists partly of fields that have lain for an unknown period in grass and partly of fields that have been laid down in grass within the last dozen years. About an acre per head suffices. The land is partly of good quality, lying on trap rock, partly very poor, being on drift gravel. Throughout the season the cows are brought into the sheds for the night and they receive there a good feed of cut clover, or of tares or vetches. In addition they have a few pounds of mixed meal, consisting of dried distillery grains, malt combs, and maize or rice flour. This costs one an average under one cent per pound. The quantity varies because, in the first flush of the grass, the animals are scarcely inclined to eat it, and at all times it is proportioned to the quantity of milk each is giving. On an average it is about four pounds a day during the summer season.

In winter the daily allowance of this mixed food is nearly doubled and two or three pounds of cotton cake meal are added. In addition the cows get as much hay and oat straw as they can eat, averaging about twelve pounds, and about half a hundredweight of turnips. The digestible

nutriment in this diet may be represented as below, fat being reckoned as twice the value of carbohydrates and included in them :

Kind of Feed.	Albuminoid.	Carbohydrates.
8 pounds mixed meal	1.2	5
2 pounds decorticated cotton meal	.7	1
12 pounds hay and straw	.5	5
56 pounds turnip	.3	3
	2.7	14

The above is, however, only to be taken as an approximation. Mr. Kinnear places great reliance on the German and American tables of digestible coefficients viewed as averages but modified according to the quality of each article. Where he thinks necessary he examines the digestible constituents of the actual foods available by analyzing them himself, according to methods of his own, and sometimes by subjecting them successively to digestion in pepsin and pancreatic solutions.

Methods in the Stable and the Dairy House. In the stalls the cows are fastened by chains around the neck, the ring of which slides on a rod so as to rise and fall as they require. The floor is of concrete, with a gutter, by which the urine is at once conducted to a tank outside. The solid matter is removed as far as possible immediately it drops, and thus not a great deal of litter is required. The passages and gutters are washed every day till the water runs perfectly clear. The cows when soiled are first scraped, then the udder is washed, and the coats are brushed clean daily. The milkers besides use a basin of clean water to each cow to wash the teats before milking.

The milk, when drawn, is at once cooled by being run over a refrigerator. But it has been found that mere aeration by being conducted in a very thin stream over wire gauze is about as effective for preserving it fresh as refrigeration. When set for raising cream, shallow pans are used without being surrounded by cold water, as it is found when milk is cooled (or even aerated) before it is set the cream rises as rapidly as if continuously surrounded by cold water. But the making of butter being quite a secondary consideration, Mr. Kinnear is not careful to extract the last percentage of fat from the milk. There is, in fact, always a sale for the skim-milk at eight cents a gallon.

The Yield of Milk. The yield of each cow is tested once a month by a day's milk being carefully weighed. Although there may be slight occasional variations, Mr. Kinnear considers that this furnishes a practical basis of sufficient correctness on which to calculate the total production for the year, especially as he has not hithero sold any cows, and only seeks information for his own judgment. He considers that the normal yield per head over the whole herd (including young and old) ought to be 6,000 pounds per annum. This has, in some years, been considerably exceeded, but during 1896 and 1897, owing to an epidemic of abortion, it fell to 5,850 and 5,350, respectively. The latter figure was brought down also by the introduction of an extra number of heifers, to make up for loss of older cows. A few individual returns may be quoted, extending over the last three years.

Name of Cow.	1895.	1896.	1897.
Violet XXII	7,110	5,770	11,020
Violet XXIV	6,200	7,720	8,580
Fleur de Lis III	7,750	7,520	7,530
Cowslip III	7,030	6,840	6,460
Lilac	8,360	8,930	9,040
Nerine III	7,710	6,970	7,950
Flora III	4,670	7,180	8,100

Diseases and Remedies. To combat abortion, most of the remedies (including Nocard's) recommended have been tried and it is believed to be now nearly extirpated. The chief reliance is placed on injection of a weak solution of izal, one of the coal antiseptics. Milk fever, or more properly parturient apoplexy, is not now dreaded, since the discovery by a Scot-

tish veterinary surgeon of the remarkable effect of chloral hydrate in this disease. It is given at first in a dose of two drams followed by doses of one dram every second hour, but it is seldom, if taken promptly, that more than two doses are required During several years a great mortality occurred among the calves. They were carried off at from a few days to a month old by rapid inflammation, attacking now one internal organ, now another. It appeared at last that it arose in spite of full use of disinfectants and perfect cleanliness from the mere fact of calves having been for too long a period brought up in the same shed. It appears to have been got rid of by repeated washing of walls and floor with chloride of lime solution made so strong that the person applying it had to hold his breath and rush to the open air for the purpose of breathing. This loss prevented the normal development of the herd by breeding only from the best animals, as the demand for milk required the whole surviving stock to be retained, and eradication was thus impossible. Care, however, has always been taken to use bulls from the best cows, and it is expected that the standard will now be raised much higher.

Influence of Food on Milk. The large number o the herd, and the keeping of a daily record of the total milk yielded, over and above the monthly measurement of the milk of each cow, has led Mr. Kinnear to form clear opinions as to the influence of food on milk. A difference of even a quarter of a pint in each animal makes on the whole (supposing 100 cows to be actually in milk) a difference of three gallons a day in the total yield, and when the whole is required for the supply of customers, such a sudden deficiency attracts attention, and its correction becomes urgent. Mr. Kinnear has thus been led to recognize that a very slight diminution either in the total amount or in the relative digestibility of the food consumed produces a sensible effect at the very next milking, while similarly an improvement in the diet will show its influence a little more slowly. but quite distinctly within the following twenty-four hours. In the same way the effect of stormy weather, of cold, of annoyance by flies, or any other discomfort, is at once apparent. The quality of the milk, however, is (over the whole herd) not sensibly influenced by any such causes. The practical conclusion is, therefore, that assuming sufficient food to be supplied, the quantity of milk yielded may be materially affected by the ratio of albuminoids to carbohydrates being made closer and closer up to about one to five, but that quality depends wholly on breed and not on feeding, within at least the ordinary practical limits. At the same time his experience has led him to the conclusion that exact adherence to to a definite albuminoid ratio is not of material importance, provided a full supply of food of good composition is given and digested. The albuminoids will then in any case be sufficient to supply both the waste of the body and the demands of milk. An extra allowance of albuminoids undoubtedly stimulates the processes, both of digestion and metabolism, through which the milk is formed, and thus it is necessary in order to obtain the full supply which the constitution of the animal enables it to furnish. But if this is attained the essential point is to furnish digestible elements from which the milk can be formed. As the fat can be derived, according to the latest scientific researches, alike from the albuminoids, the carbohydrates, and the fat of the food, it would seem not very important whether the one or the other is supplied in excess. This is supported by Mr. Kinnear's practical experience. He finds that within reasonable limits the main point is to furnish the most digestible food without too minute regard to its composition, and that such food will generally approximate to a ratio of about one to five. On an average he has found that one pound of dry digestible matter in such food yields one pound of milk, over the whole herd at one time ; that is including cows dry or nearly dry as well as those in full milk. There are, however, certain foods which appear to exercise a specific action on the milk glands and to cause an increased secretion. One of these is the carrot. This root is largely grown in the Channel Islands where a yield of twenty tons an acre is obtained. Given to cows in the quantity of fifteen to twenty pounds a day, carrots will remarkably increase the yield of milk—to such a degree, indeed, that Mr. Kinnear has in Guernsey noticed that it is difficult to keep the cows which have this allowance from falling off in condition, no matter how much food of other descriptions is consumed. In a less degree turnips, which contain about six per cent. of sugar, have a similar effect in increasing the milk flow. "Dreg," which is the liquor remaining in the stills after distillation of whiskey, is in Scotland much used by town dairymen for a like purpose, but the milk produced by it is distinctly thin and watery.

Best Use of the Land. In regard to the cultivation of the land the first point kept in view is to obtain the largest quantity of cattle food, and the second is to obtain the largest amount of other saleable produce. About 150 acres are employed for summer pasture for cows and young stock, ten to fourteen for the growth of the green food given at night in summer, 170 for hay, 160 are in grain crops, forty in turnips, and twenty in potatoes. When there is a good crop of hay about one-half of it is sold, the price being from $12.50 to $16.00 per ton. The wheat and barley are all sold and as much of the oats as is not required for the farm horses, of which fourteen are kept. consuming about two bushels of oats each per week. The potatoes also are all sold except when the prices fall below $5 per ton, when they are given to the fattening stock, not to the cows, as they tend to make the milk and butter white. On an average the 120 cows consume during the whole year the produce of 180 acres of grass, forty of turnips, and the straw of

perhaps thirty acres of grain. The grass cut for hay receives, as a rule, a top dressing of two hundred weight of sulphate of ammonia, one hundred weight of super-phosphate of lime, and one hundred weight of kainit per acre. The grain crops receive half the above quantities. Potatoes receive three hundred weight of kainit and turnips three hundred weight of super-phosphate, in addition to about ten tons per acre of the farm manure. For the last few years Mr. Kinnear has given to the pasture grass the same top dressing as to hay. He finds that it pays, in bringing the grass at least a fortnight earlier, in keeping it growing even in time of drouth, and in the enhancement of the nutritive quality of the grass. But what yields the largest amount of food is a mixture of Italian rye grass with red clover. This is sown with a grain crop. After the crop is removed it is lightly pastured and in the spring it receives a dressing of urine from the manure tank put on by means of a barrel mounted on wheels and discharging into a trough pierced with holes. This treatment gives a growth of two feet or more in height by the beginning of May. As soon as this is cut a second dressing of the same description is given which in six weeks yields a second cutting of the same bulk, a third and a fourth follow before the end of the summer In this way from thirty to forty tons of the most succulent and nutritious herbage are obtained per acre.

The Keeping of Records. All the accounts of the farm and herd are regularly kept by the system of double entry. There the herd is charged with the cost of the food grown on the farm, of purchased food, and of labor in attendance, and milking, and expense of distributing ; it is, on the other hand, credited with the amount received for milk, butter, etc., the value of the calves and the manure produced. Each several crop is similarly charged with the cost of labor spent on it, seed and manure, whether produced on the land or purchased ; and it is credited with its price if sold or its value if given to the cows or other stock. Mr. Kinnear does not, however, take account of the residual value of manure after the first crop, this being of too uncertain amount and being fairly shared among all crops by its addition to the general fertility of the land. He attributes the highest importance to the use of book-keeping in this manner. It enables him to see the exact value of every crop, and of every system of cultivation, and thus to abandon such as do not pay, while extending and improving those which are profitable

Treatment of Employees. It may be mentioned in conclusion that he adopts with the work people employed a modified system of what is known in Britain as "profit-sharing." When the accounts show a net profit after payment of expenses, interest on capital, and the normal rent of the land, divides it between himself and the work people in the proportion of their several interests, reckoning his own at the annual value of capital and land, and theirs at the annual rate of wages paid to them. In some years there has been no such profit, in others it has permitted of a bonus or dividend of from 2 to 7 per cent. to each of his wages. The laborers, both men and women, are in conformity with the custom of the neighborhood engaged by the year. They all occupy houses on the estate, which have gardens attached and are rent free. Men receive an average of $250 a year in wages, women and boys from $75 to $150. In addition the women employed in milking receive 12 cents a day. When there is a family thus working together the joint earnings may amount to from $500 to $900 a year. The total wages for labor employed on the farm are about $4,500 a year. From $2,500 to $3,000 a year are spent on purchased food, and above $1,500 on commercial manures. The hours of labor are about nine in summer and eight in winter.

Other Farm Operations. To an American, the plowing is almost a revelation. The pair of heavy Clydesdale horses move slowly, time not being considered, and the land is left in furrows straight and practically alike in elevation and angles. The plowing matches are the great yearly events, forming gala days for the countryside. The teams are resplendent with plaits and ribbons. The stacking is, however, no less a fine art. Fifty grain stacks about a single farmsteading is not an unusual array, each ready to yield about 125 bushels of grain. Every stack is thatched and will withstand the heavy fall and winter rains, and as well the crows and rooks which maintain the utmost freedom of intercourse with man and claim their full share of the products of his labor. The have not the shyness of their congener, the American crow. In Scottish farming the ultimate has been reached in tidiness, cleanliness of land and thoroughness of cultivation. It is interesting to note that American implements are quite largely used in some of their operations. This high farming speaks emphatically in its results. This year affords instances where the yield per acre reached 81 bushels of barley, 64 of wheat, 80 of oats and 350 of potatoes. Most of the grain crops are threshing extremely well for quantity and quality. Weight per bushel of barley and oats has seldom been better. It is common to have ordinary Scotch barley up to 57 and even 58 pounds per bushel this year, and oats run from 43 to 44 pounds on almost every second farm on the low grounds. Wheat is also well up. Ordinarily large crops might be said to be 40 bushels wheat, 48 barley and 56 oats. A few crops of oats have run from 96 to 112 bushels per acre and have weighed up to standard.

CARE OF MILK.

By T. B. Millar, Manager Thames Dairy Co., London, Ont.

The care of milk should begin before milking, by seeing that the cow or cows are clean, the stables and surroundings clean, as well as the utensils, and last but not least that the milker is clean.

Before commencing to milk, the cow's udder and flank should be dampened with a damp cloth or brush. By doing this, loose hairs and fine particles of dust and filth will be prevented from dropping into the milk pail, and thus much cleaner milk will be secured. The milking should be done with dry hands, and, to get the best results, should be done gently, yet quickly. Immediately after milking, the milk should be removed to some place where the surrounding atmosphere is pure, and then strained at once; for no matter how carefully it may have been drawn, there will be some dirt in it which should be strained out at once.

Air the milk frequently by dipping or pouring, or by the use of an aerator. With regard to aerators, if they are used properly and kept perfectly clean they are a good thing, but, if kept only half clean, they are a curse to the business, for a dirty aerator will spoil all the milk that goes through it.

In the very hot weather it may be necessary to cool the milk by the use of ice or water, but be sure that the milk is thoroughly aired before doing so, and never cool the milk below 68 or 70 degrees, as it will keep quite sweet over night at this temperature and will arrive at the factory in much better condition for cheese-making than if it had been cooled to 55 or 60 degrees.

Always remember that milk requires airing just as much in the cold weather as it does in the hot or warm weather, for gases and animal odors are present at all seasons, and should be allowed to escape by airing immediately after milking.

Keep the milk in small quantities over night, and, when it can be avoided, never mix the hot and the cold milk. Send the night's and morning's milk to the factory in separate cans if possible.

When the whey is returned in the milk cans, empty them at once, wash with warm water, then scald and place them where they will get plenty of sunlight and pure air. Never use soap on milk cans, pails or pans. Scour with salt occasionally. See that the place where the milk is left over night is clean and far enough away from anything that will produce a bad odor, for milk is very susceptible to flavors.

Occasionally, and the oftener the better, during the evening, the milk should be aired by dipping or pouring, thus preventing the cream from forming a leathery scum which hinders the escape of taints. If the cream is allowed to rise and become exposed to the air it will become tough and leathery and will not mix with the milk, consequently a greater amount of the fat is lost in the whey. The cheesemaker may get the blame when in reality it is the careless patron who is to be blamed. Do not leave the milk cans flat on the ground or against the side of a building, over night, but raise them on scantlings or something similar, in an open space, so that the air will circulate freely under as well as around the can.

A very good plan is to rinse the cans with a pail of cold water before putting the milk in them. See that your cows have plenty of good succulent fodder when the pastures are getting short, with free access to salt every day, and an abundant supply of pure water. As there is 87 per cent. of water in milk it is very essential that the water should be pure. The more water the cow will drink the more milk she will give, and we never object to watering the milk in this way.

Causes of Tainted Milk. Some of the causes of tainted milk are: poor, decayed fodder; dirty water, whether used for drinking water or for the washing of utensils; foul air in the cow-stable or cows lying in their manure; lack of cleanliness in milking; neglecting to air the milk rapidly directly after milking: lack of cleanliness in care of the milk, from which cause the greater number of milk taints arise; mixing fresh and old milk in the same cans, and rusty tin pails and cans.

There are hundreds of rusty milk cans in use in Ontario, which are probably the cause of the bad flavors found in a great deal of the milk delivered at our cheese factories and creameries.

It should always be remembered that pure milk can only be obtained from healthy cows, pure feed, pure water, pure air and cleanly handling. Every patron's cash receipts are affected by the way his brother patrons produce and handle their milk. Hence the necessity of each adhering to sound rules based on sound dairy sense. In not a single first-class factory in the land are good prices obtained for cheese except where all the patrons practice thorough cleanliness in the care of milk. It is a matter of profit for each to do this.

As you all know, Canadian cheese has gained a very high reputation in the markets of Great Britain, but our reputation will be of little use to us unless we keep the quality of our goods up to the mark. Other competitors are crowding us hard for the first place, and according to reports, the quality of their goods is almost, if not quite, equal to ours. So if we are to maintain the proud position that we now hold we must, as patrons, study and practice the best methods of production and of caring for the milk, until it is delivered at the factories, and endeavor to have the milk delivered in the very best possible condition. Then, as makers of cheese and butter, we must keep the factories and ourselves clean and tidy, make up this milk in the best and after the most improved methods, and have our dairy products put on the markets of the world in the very best condition possible. If we all do our duty faithfully Canadian cheese and butter will command the highest prices against all competitors.

DIFFICULTIES IN BUTTER-MAKING.

By Miss Laura Rose, Instructor in Dairying, Ontario Agricultural College, Guelph, Ont.

Almost all the difficulties met with in the dairy can be avoided by wisdom and care, but as accidents will happen in the dairy as elsewhere, it is expedient to know how to meet them. To those making butter on the farm many difficulties arise which not only render the work very laborious and exhausting to the nerves, but also frequently result in producing an inferior butter The causes of cream not churning within a reasonable time are various, and must be understood in order to apply the proper remedy. One of the chief difficulties is having too much skim-milk in the cream, which is especially apt to be the case where the cream is raised in deep cans. Such cream usually tests from fifteen to eighteen per cent. butter-fat. For such poor cream the temperature has to be high to get butter to come at all—the poorer the cream the higher the temperature.

Another condition which frequently occurs with such cream is that the butter comes in small granules, but will not gather. The most effective way to overcome this difficulty is to first add several quarts of water at about the same or a little higher temperature than the cream. This dilutes the buttermilk and causes the butter to float. After the water is in, revolve the churn a few times, let stand a little while, then draw off about half of the buttermilk, straining it through a fine sieve to catch any particles of butter. This reduces the liquid, and the butter should soon gather into the required sized granules. In some cases it may be necessary to draw off still more buttermilk. Much the better plan is to avoid having such a low per cent. of butter-fat in the cream. Use plenty of ice with your deep cans, and allow the milk to stand, if possible, twenty-four hours in summer, and thirty-six or forty-eight hours in winter. This gives less bulk of cream of a richer quality. Many are not careful enough in drawing off all the skim-milk. Cans with a slant bottom help in skimming more closely. A mistake many make is filling the churn too full. In no case should it be over half full, and a lower temperature may be used and quicker work done by starting with the churn but one-third full. Churning in a cold room will often lower the temperature sufficiently to retard the butter coming. When this happens draw off part of the cream, and gradually heat it by standing the can in a pan of hot water, stirring all the time. I never advise adding hot water directly to the cream, as it spoils both the color and texture of the butter.

Breed and the individuality of the cow has something to do with the churnability of the cream. Some cows' milk yield a softer butter fat, which quickly churns ; others produce a hard tallowy fat, very hard to churn. Feed influences the hardness or softness of the butter fat. The dry condensed feed of winter produces butter-fat which has a melting point several degrees higher than the fat produced from the succulent green fodder of summer. This accounts partly for the higher churning temperature during the winter season. A judicious selection of foods helps materially. Cotton seed cake tends to harden the butter, while linseed cake has the opposite effect. In winter there are often many cows in the herd which have been milking for a long time. The fat globules in their milk are much smaller and do not adhere together as readily as the larger ones of fresh milch cows. Then there is also present in such milk a viscous substance which prevents the massing of the globules. I have known many people to lose churning after churning from this cause. Under such circumstances I would suggest trying the following plan which has been recommended, but I have had no opportunity of testing its effectiveness since hearing it. Pour into the churn as much water as there is cream and of the same temperature. Churn a minute or two ; let stand until the cream has risen to the top ; draw off the water,

which, it is claimed, washes out the viscous substance ; proceed as with a usual churning, only avoid having the temperature too low, or the churn too full. It is well to introduce occasionally a fresh milch cow into the herd, as it helps the churning and improves the flavor of the butter. Separator cream is sometimes so rich that it thickens in the churn and concussion ceases. All that is necessary is to add a little water to thin the cream.

In the hot weather in the market will be found butter with white specks all through it—the cream has been allowed to become too sour, or has not been frequently and thoroughly stirred during the gathering and ripening process. In such a case the curdy matter settles to the bottom of the cream can, and forms a hard, thick mass which is unable to break up fine enough during churning and sticks to the fat globules. The result is not only "specky" butter, but butter of an inferior flavor. Separator cream has usually more or less foam on it. This foam must be stirred into the cream ; if not it becomes dry and will re-appear as specks of white in the butter. Besides it takes on a bad flavor, which is very injurious to the butter.

"Streaky" butter is caused by insufficient working and an uneven distribution of the salt. Wherever the salt has not penetrated, a white streak shows up. More working removes this defect. Never mix sweet cream with sour cream just before churning. The sour cream churns more quickly, and as a consequence much of the sweet cream is left in the buttermilk and quite a loss is sustained. Do not add sweet cream less than twelve hours previous to churning, and always stir thoroughly.

The only way to procure gilt-edged butter is by eternal vigilance, as that is the price of success. See that your cows are healthy, study their nature, cater to their comfort, give them plenty of wholesome food and pure water, and above all exercise the most exacting cleanliness, for thereon hinges the most important factor in dairying.

COW FOODS AND THEIR EFFECT ON BUTTER FLAVOR.

By R. McCulloch, Snelgrove, Ont.

This is one of the most important subjects that can engage the attention of the dairyman who is engaged in producing milk either for the butter factory or the home dairy. The day of high prices for butter is gone, while the demand for quality is keener than ever. The keen competition at home and abroad, brought about by the growth and development of the dairy industry, the improvement in dairy herds, the advent of the butter factory, and the gradual improvement in the quality of the farm dairy butter, has tended to lower the price of good butter, so that it needs the greatest care in every detail in order to figure out a profit in this business. We must in future see that every cow is a profitable dairy cow, and she must be fed a ration that will produce butter at a less cost, if possible, but still of choice quality, in order to get the highest price. In judging butter, the following is a score in common use, viz., flavor, 45 ; grain, 25 ; color, 15 ; salting, 10 ; packing, 5. Nearly one-half the points are allowed for flavor, but when I put my butter on the market nearly every quality seems to be subordinate to flavor. It is the flavor in butter that gives it its value. Butter of nice, sweet, nutty flavor is a great luxury and sells readily, while off-flavored butter, from whatever cause, is worth but little. When fault is found with butter flavor and the quality is complained of, the butter-maker is generally blamed, whether it is made by the factory manager or the farmer's wife, while in nine cases out of ten, I am firmly convinced that the fault is at the other end of the business. After we have become well acquainted with every detail of butter making, the work is largely mechanical. Care, cleanliness and right temperature will, as a rule, ensure success. The dairyman has an important part under his control, viz., the food, the condition and care of the cows and stables, the milking and care of the milk ; and I think first among these, and demanding more attention than any other, is the food, for I believe that flavor in butter, good and bad, goes in largely at the cow's mouth.

Summer Foods. It is a bad plan to change foods suddenly at any time. In spring we turn the cows on grass in the day time, while we still stable them at night, giving a feed of good hay in the morning, if we have it. The change in flavor and color of the butter is thus made gradually. June grass and timothy grass make good flavored butter, and is often a relief from winter foods, if these are not of the best quality. Customers are glad to get grass butter and dairymen are glad of a relief from winter feeding. The clover field is ready, rank and green, and in they go, and in a few days we have more flavor than we want. I do not like clover milk, but we have seldom had complaints from clover flavor in the butter. But the flavor from alsike clover, either in pasture or hay, nobody wants, so we do not grow it. After a while the pastures become dry and it is necessary to have some green food ready to keep up the milk

flow. Some sow fall rye for this purpose, but it soon becomes woody, and if cured for hay is of little value. We think a mixture of peas and oats is as good as any crop for this purpose. If it was fed to excess the flavor might be objectionable, but together with some pasture it is all right. Then comes the after grasses on the meadows, and later on the green corn, and this brings us to the hardest time of the year to make butter. It is fly time with the cows, and dog days with the cream and butter, but relief comes with cooler weather. Then we come to the best time of all the year for making good solid, sweet, well flavored butter. We have still the fall pasture, some green or shocked corn, and the pumpkins, and this with some grain makes a grand combination. The fall of the year is a hard time to keep up the milk flow. The weather is colder, with winds, and then the change from fields to stables all work against the cows until they are establishedin winter quarters.

Winter Foods. For the bulky part of our ration we depend on clover hay, peas and oats cured, oat straw and chaff with corn ensilage and mangels as the succulent part, and for the grain ration we feed peas and oats and wheat bran. We have never yet found anything equal for winter feeding to bright well-cured clover hay, either in feeding value or in regard to the flavor of the butter. Clover hay is at once the easiest crop on our land, the richest in food value as a milk producer, and the best food we have found to produce a nice-flavored butter in the winter time. Any objectionable flavor found from clover pasture is overcome in the well-cured hay. Next in value to clover I would place hay of peas and oats. We have grown this crop for three years and like it better each year. We sow two bushels to the acre of equal parts by measure of peas and oats, cut with the mower when the oats have grown to the full length. We cut this year over two tons to the acre of as nice green feed as I ever saw. It is eaten greedily by either horses or cattle. It is very little worse to cure than a crop of clover, and it produces butter of a good flavor. Mixed with oat straw, we run it through a cutting box. By cutting it green we save twine, threshing and grinding, our aim being to get, if possible, a higher flavored bulky food ration. By cutting all our hay earlier and curing it more carefully, also harvesting our oat crop a little on the green side, shocking carefully, so that the straw is neither over ripe nor musty, we can add very much to the feeding value of our bulky foods, and at the same time save very much of the aroma and flavor that is often lost by letting our hay and grains become over ripe and woody or musty and bleached by a careless method of curing.

Corn Ensilage. I am not a silo enthusiast. We have had good results from feeding ensilage, and we have had poor results also. If the ensilage is good and has a pleasant smell, as good ensilage has, it will make good butter, but if it is very sour or mouldy it should not be fed to milking cows, as there is almost sure to be trouble. The important question is, "How to make good ensilage?" I have seen some very fine ensilage, and I have been in many silos where it was poor stuff indeed. Corn, to make good ensilage, should be of a variety that will mature in the locality where it is grown. It should be sown thin, so that it will make a good stalk and ear well. It will also stand drouth better and be less hurt from frost if thin and stalky. Also there will be less leaves on it, which are an injury in the silo, especially if they are dry or frosted. The sweetest and best ensilage I ever saw was made from Canada yellow corn. The crop was not very large, but it was full of cobs and of good quality. The only trouble was there was not enough of it. There is apt to be more acid in ensilage made from the Dent varieties, but if it is well matured and stored in a good round silo it will also do well. Some leave cut and shocked big corn for a time and after much of the sap had dried out have cut and put it into a silo, and by adding some water have succeeded in making good ensilage. The round or octagon silos are giving much better results in our locality than square ones. To make good ensilage the conditions must be as nearly right as possible. Enough ensilage, cut feed and chaff are mixed for a day's feeding at once. The grain ration is given with this morning and night, and this with one good feed of clover hay will satisfy any cow. Our grain ration is made up of peas and oats chopped and wheat bran. We have found that these give the best results as regards flavor in the butter. Barley meal never gave us good results. If much of it is fed the cream will be troublesome, slow to ripen and slower to churn, and possibly the butter will be off-flavored. It pays much better to feed it to hogs than to cows.

As to roots, we think carrots best. We would feed lightly of mangels, and would place turnips in the list of doubtful foods, if we wish to make good sweet butter. I am aware that the new process of pasturizing does away with all evils in cream, yet I fear it would kill good flavors as well, and as it is hard to get much flavor in butter in winter it seems a pity to buy it dearly in good feed and throw it away again.

WINTER DAIRYING.

By Jas. Stonehouse, Port Perry, Ont.

Winter dairying is a subject which is receiving a good deal of attention through the press, and which is agitating the minds of many of our best farmers at the present time. The time was when a great majority of farmers never thought of keeping their cows milking longer than about the beginning of the New Year, with the exception of perhaps one, which had come in as a winter cow to provide milk for their own consumption. Winter dairying was generally voted a nuisance and no money in it, but this winter dairying has changed in many places and has taken on a new aspect since the advent of the winter creamery. Bank barns and comfortable stables are now the rule rather than the exception, and farmers are becoming better situated to give their cows the necessary care and attention during the winter months, and where the milk can be sent to the creamery the farmers are realizing that there is more money in winter dairying than in summer, but it requires more intelligence and care in feeding and caring for the cows in winter than in summer, when the cows get their living from the fields, and where the milk is sent to the creamery only twice or three times per week it requires care and good judgment in order to send milk that will make a first-class article of butter.

When our butter goes into the British market it comes in competition with the best butter produced in the world, and it behooves every creamery patron in the Province to see that there is nothing in his milk which will injure the quality of the butter turned out of his creamery. The flavor and quality of the butter is governed largely by the flavor and quality of the milk you send to the creamery, and you have more to do with that flavor and quality in the winter time than the cow has. In the summer time grass is the universal feed for cows, and if they have a plentiful supply of pure water the milk will usually be in perfect condition when it goes into the milk can, and with proper aerating and cooling of the evening's milk (supposing the can is all right) it will usually arrive at the factory or creamery in prime condition ; but in winter we have dirty stables, dirty cows, dirty milkers and improper food to contend with.

A good many ask what breed of cows is the best for a dairy farmer to keep. Keep the breed for which you have the greatest liking and can get the best returns from. Some fancy one breed and some another, and there are good and bad in all breeds, but no cow should be allowed to occupy a stall in any farmer's barn who will not pay a good profit over the cost of her feed and care. It takes a certain amount of food to keep the vital machinery of a cow in motion. This includes the keeping of the animal heat at the right point, the circulation of the blood, the digestion of the food, the elaboration of the milk, and all the other vital functions which go to make up the life of the animal, yet how many farmers there are who withhold from their cows the food that is necessary to keep up their flesh and expect them to give a paying quantity of milk, for no matter how good a cow such a man may have, she can never return her owner any profit simply because he will not give her the food necessary to do so. It has been estimated that it takes $25 a year to keep a cow in Ontario, but there are thousands of cows which do not begin to return to their owners that amount, no matter how they are fed. These are the kind of cows which no farmer should keep who wants to make dairying pay. It is not a hard matter now to find out which cows pay and which do not. A Babcock milk-tester which would do half a dozen farmers can be bought for $6 or $8, and a splendid book on testing milk and its products can be bought for a dollar ; what better educator could a man have than such a machine ? If any farmer will act upon the knowledge which a Babcock tester will reveal him, inside of three years he will increase the profits of his dairying a hundred fold.

It is no particular benefit for anyone to take a single sample of cow's milk to the cheese factory or creamery to be tested, because that alone will be no criterion as to what a cow will do in the course of a year. To do it intelligently a sample of milk should be taken at each milking for three or four days or a week, and kept in a closed bottle into which a small quantity of bi-chromate of potash or some other milk preservative has been put, and then a sample of this composite milk should be tested so as to get at the average, because the percentage of fat in a cow's milk is continually varying, and no two milkings will test exactly alike. While the samples are being taken the cow's milk should be weighed at every milking so as to compute how much butter-fat a cow will produce in a given length of time, and this should be done three times in a year. If the milk is not weighed the test will give you nothing definite, for one cow may test 3% and another 5% and you will naturally think that the cow which tests 5% would be the best cow But supposing the one which tests 5% gives 100 lbs. of milk per week and the 3% one gives 200 lbs. in a week, the one which gives the richer milk would give 5 lbs. of butter fat while the one giving the poor milk would give 6 lbs. of fat or one pound of fat and 100 lbs. of kim milk more than the other, and that one pound of butter fat and 100 lbs. o skim-milk might very easily

represent the whole profit which you were getting from these two cows over the cost of their keep. Now, to sum up a good dairy cow, you must have one that will consume large quantities of food and return the greater part of it to you in milk and butter-fat, and one that will keep at it the greater part of the year.

Cheap feed is what we want as well as good cows, and a cent per pound saved at this end by cheapening the feed is just as good as a cent per pound at the other end for our butter and cheese, yet how few look at it that way. We are all looking at the other end for our profits, yet there is just as great a chance for profit or loss at the feeding end as there is at the selling end. Did you ever hear one farmer ask another how much it cost him to produce his hundred pounds of butter or cheese? I will venture to say you never did, yet that part of it is of far greater importance to the farmers than the markets for our cow products, for it involves better methods of farming, increasing the fertility of the soil, making one acre produce as much as two has done heretofore and keeping cows that pay a good profit. Take, for instance, two farmers living side by side each working 100 acres of land. One man reads but little, takes no agricultural paper, does not believe in growing corn, and cannot afford to seed down very much, but depends chiefly on grain growing with a few acres of turnips; he puts most of his straw in a stack in the barnyard, has but little use for a straw cutter, turns his cows out in the winter time in all kinds of weather to drink ice cold water and feed at the straw stack during the day and get exercise, and takes them in at night chilled to the bone. Although he may have a comfortable stable, and a fairly liberal supper for them yet there is but little milk in their udders simply because it has taken all their energy in trying to keep warm during the day, and what little butter he gets from them in the winter time is of poor quality and so strong of turnips that nobody wants it.

The other man is a model farmer. He takes the best papers he can get on farming and is a keen observer of what others are doing in his line. He grows six or eight acres of corn, seeds down fifteen or twenty acres every year, has a silo for his corn, grows mangels for his cows instead of turnips, puts all his straw under cover, uses his cutting-box during the winter, buys bran and even oil cake for his cows, keeps them in clean and comfortable stables seven days in the week, gives them appetizing food and keeps double the number of cows on his 100 acres, besides as much other stock, and makes butter that every lover of good butter wants, and it costs him less per pound to make it than it does his neighbor, because he grows and feeds food that will produce milk, and gives his cows the comfort necessary for them to use their food to the best advantage. The solution of the question of cheap milk lies in the silo, for good corn silage is undoubtedly the best and cheapest milk-producing food which has yet been grown, but it has got to be made from well-matured corn and judiciously fed in connection with other foods in order to obtain the best results. A great many cling to the idea that dry corn fodder is as good for milk production as siloed corn, but careful experiments have been made to test the relative value of the two foods, and the results have always been largely in favor of the silage when it was made from well-matured corn. Where winter dairying is paying the best in this Province, silos are coming more and more into favor every year, and they are now built so cheaply that there is but little excuse for any farmer being without one. Mangels should take the place of turnips for milking cows, as they impart no unpleasant flavor to the milk or butter, but turnipy butter is so objectionable to the British consumer that buyers are very careful now about buying butter with a flavor of turnips. In order to make a cow do her best at the pail, she has got to have a certain proportion of different milk-producing foods for winter dairying. There are patrons sending milk to creameries whose milk is worth from ten to twenty cents. per 100 lbs. more than the milk of some other patrons, though it may not make any more butter. It is in the difference in the quality of the butter, and this difference in the quality is made by the difference in the feed. If cows are fed on turnips and straw, the milk from those cows may produce just as much butter per 100 lbs. of milk, providing you can get it all out, yet it will be sorry looking stuff—white, hard and tallowy, and you have got to have it almost at the melting point before it will spread, while the other butter is tough and waxy, and at an ordinary temperature will spread like September butter. There are three kinds of fat in our butter: palmatin, stearin and oleine. The oleine is an oily fat while the other two are tallowy fats, and where cows get most of their winter living from the straw stack their butter contains very little of the oily fat and is white and tallowy, but if cows are fed liberally upon ensilage, clover hay, mangels, bran, oat and pea meal or oil cake, their butter will have a good proportion of the oily fat which makes it worth several cents per pound more than the tallowy butter. We may get milk from different patrons testing just the same, yet one man's milk may be, and often is, worth a good deal more than his neighbor's, all on account of the different methods of feeding, and if we are to send first-class butter out of our creameries we must have milk made from first-class feed.

A cow is a clean animal, and her surroundings ought to be kept reasonably clean. One of the regular things to be done every fall should be to sweep down the cobwebs laden with dust festooning the whole ceiling which are often left to accumulate from one year to another, and why should not a stable be whitewashed once in a couple of years at least? It is a comparatively

easy matter where a farmer has a spray pump. When the cows are first taken in, in the fall, the hair should be carefully clipped from their thighs and udders and cut off the switch, then your cows are in a shape to keep clean if you give them half a chance, and when you go and sit down to milk them you have an opportunity of cleaning the udder pretty well before commencing to milk. No one should ever go to the stable to milk in the winter time without carrying some warm water, and having an old pail and a good sized cloth at the stable for the purpose of washing and drying the cow's udder. Sometimes they are not to say dirty, but they should always be wiped with a damp cloth if not washed. But do not commence at one end of a row of cows and clean the udders of the whole row before commencing to milk, because the moment you commence to handle the udders the cow begins to let down her milk, and if you do not go on and milk her you do her an injury. Milkers should not milk a cow with dirty hands any more than they should milk a cow that has dirty teats and udder. A great many stables throughout the country are not fit places for cows to dwell in if we are to expect pure milk from them. They are dark and dirty, with no attempt whatever at ventilation. I have seen fifty or sixty ft. stables with just one window in the whole length, just as if the owner was afraid that a little light was going to injure his stock. I was in a stable last winter in western Ontario where the owner had changed his stalls from the old-fashioned drop behind the cows and the ordinary feed-box to an arrangement similar to the "Hoard" stall, and his cows were as sleek and clean on their thighs and udders as if they were running in clover. What would the farmers o our Province think if our Government should appoint inspectors to visit the cow byres of patrons who supply milk to creameries in the winter time and condemn the milk as unfit for butter-making unless there was a reasonable amount of care and cleanliness bestowed upon its production? The authorities in our large cities have the power to send men to inspect the sources of their milk supply, and if they find unsanitary conditions around the premises they will prohibit the milkman from selling his milk in the city for human consumption, and why should not the consumers of butter be accorded the same protection?

Milk should be taken from the stable as soon as possible after milking and strained into the can. Always strain your milk summer and winter. Some actually do not think it necessary to strain it because it will be strained at the creamery. They would leave the hairs, bits of manure, scales off the cow's udder and straw end to make an infusion of stable odors and expect the factory strainer to take it all out, odor and all. Do not keep your can where the milk will absorb kitchen odors, for they are as fatal to good butter as stable odors. Do not put warm milk into the can and then shove the cover down and imprison the animal odor, for there is no surer way of spoiling milk and giving it that old half-bitter flavor which we find in so much winter milk.

The proper aeration of milk, either by the use of the acrator or by dipping or pouring, is the great secret of keeping milk sweet and of good flavor, and we find in our creamery work that the better the milk is cared for the more uniform and satisfactory the test will be, and as you are paid by the Babcock test it is to your interest to take the best possible care of your milk. A good many, by neglect, allow a thick coat of cream to rise on their milk which will not mix again with their milk but floats around on top and is often churned on the road to the creamery, which takes just that much butter-fat out of the milk, and the test is lowered accordingly; and if this occurs a few times during the month, then there is dissatisfaction and the Babcock tester and the men who make the test are blamed for what is purely the patron's own fault.

POULTRY DEPARTMENT.

POULTRY BREEDING ON THE FARM.

R. H. Essex, of Toronto, in an address delivered at a Farmers' Institute, points out that the market for poultry is practically inexhaustible. There is sufficient demand in Canadian markets for all the first-class stock that can be raised in many years. In addition there are great advantages in the British market. In 1896 Great Britain imported $20,000,000 worth of eggs; of which Canada supplied less than $1,000,000. Imports of poultry and game amounted to $3,500,000, of which Canada contributed only $30,000, whereas in cheese the Dominion furnished one-half of the $24,000,000 imported. As the British market was captured by exporting cheese of a superior quality, the egg and poultry trade can be increased in the same way. The importance of paying attention to quality was illustrated by an experiment made by Armour & Co., who, on receiving a shipment of superior poultry, sent one case to each of five leading American cities, in order to see whether higher prices could be obtained for it than for the ordinary grade. The poultry sold rapidly, realizing two cents per pound more than ordinary stock sold the same day, and much more could easily have been disposed of at the same figures.

To get the best results, poultry should be bred on the same principle as that followed in cattle and horse breeding. Producers should breed for those qualities they wish to obtain; either as table fowl or egg-producers. Indian Game and Dorkings are recommended as desirable types to breed for market, and also the Cochin, Brahma, Houdan, La Fleche and Langshan. These are all distinctly first-class varieties of table fowl, where egg-production is a secondary consideration.

The Leghorn is a typical egg-producing fowl, but it is too spare in build to be a suitable breed for the table. Of this breed there are the white, brown, buff and many other varieties. Other good egg-yielders are the Minorca, Spanish and Andalusian, which may all be bred with profit if eggs rather than flesh are the leading object.

There is a general purpose fowl just as there is a general purpose horse—one that is both a good egg-producer and market fowl. This type is larger and deeper than the Leghorn—a much better table fowl but not so good an egg-producer—and, on the other hand, while not so good a table fowl as the Dorking, it is a better layer. These birds are designated the American Class, and include, among others, the barred, white and buff Plymouth Rocks, and the golden, silver, white, black and buff Wyandottes.

Careful breeding has developed these different varieties with a view to the special requirements of the producer. It is absurd, therefore, for the farmer to continually cross and re-cross his fowls, which merely undoes the work that has taken years to perfect. He should simply take his choice of the great variety of existing breeds, according to his particular requirements, and introduce thoroughbred blood to his stock There is only one case in which a cross can be beneficial, and that is where the stock has degenerated by inbreeding. A cross in such case may increase the stamina of the flock, but even then it is undesirable if new blood of the same breed can be procured. While improvement may result in these cases from crossing, degeneration will ensue if the process is continued. Never go further than the first cross, if it is considered advisable to cross at all.

It is a great mistake to gather eggs indiscriminately for setting purposes. Place the hens you prefer in a pen by themselves very early in the spring and mate them with a large, vigorous male of the same breed. Nearly every fancier will have a few males he will sell for $1.00 or $1.50, which, though perhaps inferior for show purposes, will be practically as good as a five or ten dollar bird. It is well to see the bird before purchasing, to make sure that it is healthy. See that the hens are not over-fat, or the eggs may not hatch, or if they do, the produce will be unhealthy. In other cases the shells will be thin and the eggs get broken in the nest.

Set your hens in a secluded spot, and on this occasion feed them all they will eat. Food and fresh water should be constantly within reach, and the hens should be provided with a convenient place to dust in. When the chicks arrive see that the broken shells are removed from the nest, so that none of them shall cover those remaining unhatched, as sometimes happens Never allow the hen to sit in the nest she has been laying in, as it is apt to be infested with lice. Remove her at night to the place selected for setting. Chicks need no feed for the first day or so after hatching; afterwards anything easily digested, such as bread crumbs, granulated oatmeal, rolled wheat, etc., may be given them. If you feed hard-boiled eggs mix with bread,

crumbs, as too much hard-boiled egg causes indigestion. When old enough to eat wheat, let them have it, with a variety of other small grain. If they are late hatched, feeding with grain will hasten maturity, but if hatched early in the season it is not advisable to develop them too quickly as they thereby lose in size. The principal feed of early-hatched birds after the first six weeks or two months should be oats. Always feed a variety of grain.

If winter egg-production is desired the pullets should be placed in the house where they will be kept permanently, about the end of October or beginning of November. Having been hatched early and fed for size they will be in good condition to commence laying, and under proper conditions will lay all winter.

W. R. Graham, manager and lecturer, Poultry Department, O.A.C., Guelph, in an address delivered before several meetings, said that hens selected from the flock for breeding purposes should be mated about ten days before eggs are wanted for hatching. Give the flock a roomy pen, allowing at least eight square feet of floor space to each fowl. Also give an out-door run if possible. Induce the hens to take exercise and feed a liberal ration of meat or bone—factors which play an important part in getting strong, fertile eggs. Hens lay more eggs, which have a superior flavor and good keeping properties, when the male bird is kept away from them. After the breeding season is over either kill the male bird or keep him by himself. Where a number of surplus males are kept they simply consume a share of the profits made by the laying hens. No more should be retained than are really necessary.

Hens should be set as far as possible outside the hen house in order to avoid vermin. When a hen has become broody arrange a nest in some quiet building or pen. Make it about fifteen inches square, place an old sod at the bottom and on this put some chaff and straw. Dust it with sulphur and if convenient put a bunch of tansy in the nest. Where this is used vermin will not appear unless they are previously abundant. About a dozen earthen eggs should first be placed in the nest and the hen should be introduced at night and the nest closed so as to keep her shut up for the next day. If she sits well remove the nest eggs and put in the good ones. If three or more hens are set simultaneously, the infertile eggs can be advantageously removed on the eighth day. If the eggs are held directly between the eye and the light of an ordinary house lamp an infertile egg looks clear, while a fertile one at this stage is dark. The fertile eggs can usually be got under two hens and the other fowls can be re-set or broken up.

The food of the chicks after the first few days should be gradually changed from bread crumbs or rolled oats to a diet of 50 per cent. corn, 25 per cent. bran and the remainder of finely ground oats and peas or barley. If a large number are being raised it is a good plan to add about 10 per cent. of animal meal to the ration. Mixing with boiling water or cooking the food makes them thrive better. Feed every two or three hours, and be sure that a plentiful supply of pure water is always at hand. The vessel should be so arranged that the chicks cannot stand in it, as wet feet are not conducive to good health. One plan is to take an ordinary tomato or corn can, punch a few holes near the open end, fill the can with water, place a saucer over it and reverse the can. This prevents the chicks getting their feet in the water, which flows into the accessible part of the saucer from the can as it is consumed.

Fowls should be well fattened before killing, as not only do fat fowls sell for a few cents more per pound than those in ordinary flesh, but it has been shown by experiment that there is three times as much meat on well fatted poultry as on the unfattened. To produce a nice yellow fat feed largely on yellow corn and meat, but to obtain a white fat use buckwheat, barley and oats, mixed with skim-milk. In fattening, confine the fowls to a small pen ; avoid exercise and furnish plenty of grit and water. Give all the food they will eat. Usually about two weeks of this treatment will fatten a well matured chicken, but to get fowls very fat four weeks s required.

Always pluck dry, as dealers never pay a large price for scalded stock, and do not care to handle it. The fowls should fast for at least eighteen hours or until the crop is empty before killing. Kill by sticking in the roof of the mouth, and cut both jugular veins. Commence picking immediately, and the feathers can be removed easily and quickly. Leave the outer wing tips and half the neck unpicked, and, if intended for the British market, leave the tail feathers. Wash all blood from the head, and allow the bird to thoroughly cool before packing for shipment. In picking ducks remove the down by dampening the hand, hold the skin of the duck tight, and rub in the opposite direction to which the down lies. Remove pins by shaving with a very sharp knife.

Mr. Graham further urged the desirability of raising poultry for the British market. He said the value of poultry and game exported from Canada to Britain has increased, from 1896 to 1898, at the rate of 430 per cent. which is considerably in excess of the rate of increase in any other of our food exports to the same market, notwithstanding that the total volume of our poultry shipments there is yet small. The result of experiments by Prof. Robertson in fatten-

ing and shipping poultry to supply the British demand, has shown that birds weighing 5 pounds each, crosses of some of larger breeds, are the most profitable to feed for this purpose. White are preferred to yellow-fleshed fowls. Eggs sell in England by the pound, and large eggs fetch a premium over the smaller article. It is not necessary altogether to discard the yellow-fleshed fowl, as the difference in price in favor of the white-fleshed is not very great. A Dorking-Indian Game cross, which gives plenty of juicy breast meat, is said to be the most popular. Plymouth Rock and Wyandotte crosses come next on the list. As regards the profits of poultry-keeping, James Dryden, in Bulletin 51 of the Agricultural Experiment Station of Utah, U. S., clearly shows that pullets yield a handsome profit, while hens of four or five years of age are but slightly, if at all, remunerative. Not only did the old hens lay fewer eggs but they laid them at a time when the eggs were worth less per dozen. The experiment was conducted on the basis of giving some of the hens exercise, and depriving others of it. Those having exercise gave the larger returns, as though they consumed more food they yielded a greater percentage of profit as shown by the following table:

Pen.	No exercise.	Cost of food.	Number of eggs laid.	Value.	Food cost per doz.	Per cent. profit on feed.
		cts.		$ cts.	cts.	
1	Old hens	53¼	64	.56	9.9	5
2	Late hatched pullets	56¼	137⅛	1.32	4.9	135
3	Early " "	61¼	157⅜	1.68	4.6	174
	Exercise.					
4	Early hatched pullets	62	181⅜	1.88	4.1	203
5	Old hens	62	106⅜	1.00	6.9	61
	Late hatched pullets	63	150¾	1.51	5.0	124

After taking the amount of the various foods given, the cost would be somewhat less than in Canada, but as eggs would sell for a higher average price the profits would be very similar.

A. G. Gilbert, of the Ottawa Experimental Farm, also conducted an experiment with fifty yearling hens and pullets, proved that by feeding meat and giving fowls free range, they could be forced to moult in July and August, and therefore would be in good condition to begin laying early in the winter. Another point he established was that eggs could be produced in December at a cost of eight cents per dozen. The profit shown was $2 per hen, but this is hardly to be expected from an ordinary farm, as some 40 dozen of eggs were sold for hatching purposes at $1 per sitting. When the value of the eggs was all reckoned at market prices, a profit of $52.50 is shown on the fifty hens.

Skim-milk as a Valuable Food for Young Ducks. In an experiment conducted at the Ontario Agricultural College in the summer of 1899 it was found that skim-milk was a valuable and cheap food for raising young ducks. A lot of ducks was divided evenly and fed upon a mixture composed of equal parts of bran middlings and corn meal. For Lot I the mixture was moistened with skim milk, while for the diet of Lot II boiling water was used, Lot II also received a small amount of animal meat and cut green bone in their ration. At the end of six weeks all were weighed. The average weight of those in Lot I was over four pounds each, produced at a cost of 3.6 cents per pound. The average weight of Lot II was three pounds each and the cost of production 3.8 per pound, the cost in both cases representing the feed only, without reckoning the eggs or attendance. During the next four weeks both lots were fed alike and their respective gain was nearly equal, Lot I having an average weight of 6½ pounds each, while the others averaged nearly 5½ pounds, but during this period it required more food to produce the one pound gained, the cost being about five cents per pound.

When the ducks were fifteen weeks old they were again weighed, showing an average of 8 pounds each. Some chickens of the same age averaged 3¾ pounds each. Estimating as carefully as possible the cost of raising a chicken is about five cents per pound. Ducks have good appetites and should be sold when at a weight of about 5 pounds each in order to secure the most profit. Chickens require to be nearly five months old to reach this weight. Neither the ducks nor the chickens were fat when weighed, being in ordinary growing condition.

D. Munro, Ealing, treats of Profit in Poultry in an address delivered at the Thorndale Institute meeting, Middlesex, on the 20th of February, 1899. He contended that while poultry-raising would, if properly managed, return the largest profits of any department of farm industry, and had the greatest possibilities before it of an increasing market, as a matter of past experience the returns had as a rule been very small, as compared with the food outlay and labor involved. The average egg production is considerably below 100 per hen per annum, and the average price perhaps below ten cents per dozen, while poultry, when marketed, will not bring more than from thirty to fifty cents per pair. As the cost of the feed of a hen is at least fifty cents per annum, saying nothing about the care required, the margin of profit was exceedingly small. On the other hand, hens under favored conditions will lay from 160 to 200 and in rare cases 300 eggs per year, and poultry specially fitted and prepared for the best markets may bring from $1 to $1.75 per pair. Among the reasons for the prevailing low average yield are the retaining of hens in the flock after they have lost their usefulness, keeping a number of unnecessary males, and neglect of proper housing and attention. A farmer who would not think for a moment of retaining a cow or other animal after it had ceased to be profitable is often wholly indifferent to the individual standing and record of his poultry. If he saw his neighbor's milch cow tied in the orchar in cold weather he would be disposed to report him to the authorities for cruelty to animals, when at the same time his own hens may be finding shelter in the trees. The one is as rational as the other.

During the winter months feed the birds a ration which approaches as nearly as possible the food they would collect for themselves on a free range in summer. Where grain alone is provided, the cost of feeding increases and the egg yield diminishes. Scraps from the table should be given and roots, vegetables and clover are available on most farms. If thus cared for the egg yield will certainly exceed 100 per hen per annum. The cost of feeding will be from 50 cents to $1 per hen. If a flock yields but fifty eggs each per annum, they will barely pay for what they consume. If they average 100 eggs the profit can be placed at fifty per cent. on eggs, and fifty per cent. on young stock. Should they average 150 eggs each, the profit may be reckoned at at least one dollar per hen. In raising poultry for the market there are perhaps equal profits from chickens, turkeys, ducks and geese. There is an additional benefit in keeping turkeys and ducks in the destruction of grasshoppers and insects, which they devour in numbers.

FATTENING CHICKENS FOR THE BRITISH AND HOME MARKETS.

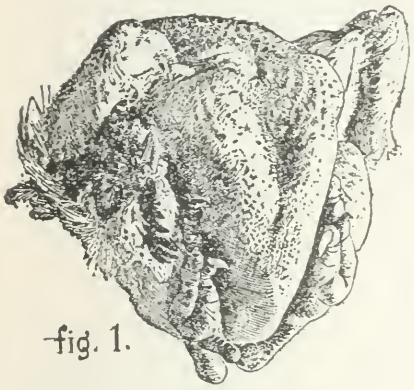
By A. G. Gilbert, Central Experimental Farm, Ottawa, Ont.

There is almost an unlimited market in Great Britain for a superior quality of Canadian poultry in the shape of turkeys, geese, ducks and chickens. The farmers of Canada may as well realize now, as later, that they cannot produce superior birds unless they conform to certain imperative conditions. These are, first, to keep stock of the breeds which make the best market chickens in the shortest time; second, to properly care for, house, and feed the chickens from the time of hatching (whether by incubator or hen) until they are ready to be disposed of.

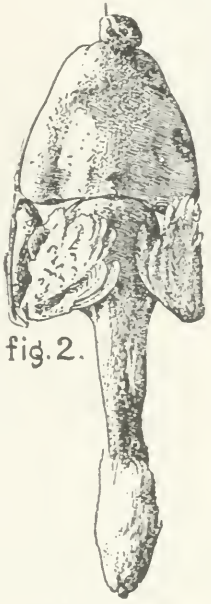
What Breeds to Keep. The first condition is one with which it is not difficult to comply. The best winter layers and most rapid flesh formers are to be found among the Plymouth Rocks, Wyandottes, Light Brahmas, Cochins, and some of their crosses, the two first named breeds being preferred because they are more easily procured and at a cheaper cost than other breeds. It is not often convenient or desirable for a farmer to have crosses, unless he is a specialist, who is breeding for flesh with a certain cross which he has found to suit his purpose best. Indeed, the majority of our farmers should at once realize that the "scrub" or inbred barnyard chicken, which is good for neither flesh nor eggs, must be got rid of. They might as well try to make beef animals out of Jerseys or Clyde horses from Shetlands, as to expect to get heavy and rapid flesh formers from "scrubs." Experience, begotten by years of experiment and successful practical operation, has proved that the breeds named best fill the dual requirements of eggs and flesh.

Care and Feed Necessary from Birth. To successfully comply with the second condition the chickens must be attended to from the time of hatching, particularly during the first

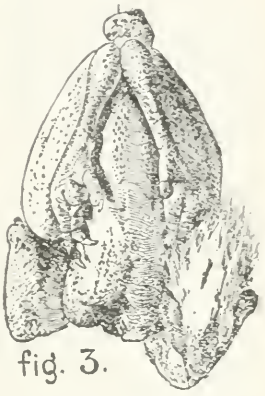
five weeks of their existence, because during that time there is a drain on the system for the making of bone, sinew and the rapidly growing feathers. Chickens which are allowed to become stunted from being under-fed during this period will not make satisfactory market fowls, early layers or show birds. Chickens which have been well attended to, cooped up for two or three weeks, either singly or in trios, properly fed and killed, will be very plump and tender, and will bring the highest price from English dealers.



White Plymouth Rock Cockerel dressed for sale on the English market, plucked but not drawn. Feathers on wing tips and head placed under wing.



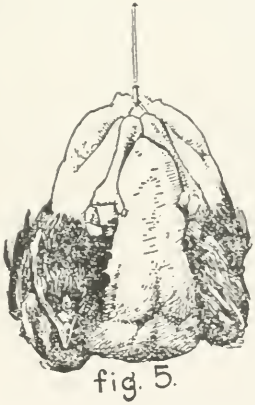
Shows the back of a cockerel ready to be packed for shipment. The bird is plucked but not drawn.



Front view of same bird. the head is put under the wing.

In passing, it may be remarked that while in some Canadian cities the birds are dressed and exposed for sale as above, in the great majority of cases they are not. Even the old hen can be put to good account, and when properly fattened and dressed can be made inviting in appearance. Still better, when properly cooked, they are good eating. See the following:

Back view of three year old hen, plucked but not drawn. It also shows how a bird should look when packed for shipment.



Front view of hen in Fig. 4.

All the cockerels illustrated above are of the superior class of poultry required for the British market. It must be remembered that they are as easily reared as a "scrub" and at no more cost. The old hen is a common type of Plymouth Rock. She has been properly fattened.

The Final Fattening Stage Having been properly cared for and fed, the birds before being killed may be penned up in single pens, as shown hereafter, or in trios or more. They should receive no food for a day or so, until they are accustomed to their new quarters. They should then be fed twice or thrice a day all they will eat of a ration composed of two parts of very finely ground oats, one part of finely ground barley, and one part of corn meal. The latter may be omitted if it is found to give a yellowish tinge to the flesh. Instead of the oatmeal, finely ground shorts may be used, but English fatteners prefer oatmeal. During the last ten days a small quantity of tallow added to the ration will be found effective. Our experience is that thoroughbred Plymouth Rocks, Wyandottes,

Light Brahmas and Cochins require no cramming machine to force on flesh. The crammer has a tendency to make fat, but where it is necessary it may be used after the fowls have been given all they will voluntarily eat for ten days. If, at the end of ten days, it has been found that their appetite is not so good the forced feeding is resorted to.

How to Kill, Pluck and Dress. The British poultry dealers demand that the birds should be killed by dislocation of the neck. Immediately after the dislocation of the neck, indeed before the fluttering of the wings ceases, the plucking of the fowl should begin. Care must be taken that the flesh of the bird is in no way torn or bruised. The bird should be so held that its head will hang down. By so doing the blood will run to and coagulate in the neck. It is imperative that all poultry should be fasted for 24 or 36 hours previous to being killed. Should any food be in the crop of the bird, when killed, it will surely decompose and ruin the carcass. This is worth remembering, for neglect of this precaution has brought disaster to numerous shipments of turkeys, which otherwise would have been successful. After plucking, lay the birds on their breasts on a V-shaped pressing trough and gently press the rump square. This will give the carcass a compact shape and add much to its appearance. When plucking, feathers should be left on the neck for three inches from the head and on the ends of the wings, as shown in Figs. 2 and 4.

Something to be Avoided. On no account should the birds be dipped into hot water before being plucked, as is frequently practised, in order to permit of easy plucking. Fowls which have been dipped in hot water are unsaleable in the British markets. Avoid shipping birds with blood stained skins, or with dirt on their feet or legs. No birds should be packed until they are thoroughly cooled. Much loss has been experienced by shippers who have neglected this precaution. In one case a whole shipment of turkeys was lost.

The Home Market. For shipment to home markets the birds must present a plump and inviting appearance, and should be fattened in the manner mentioned above. Kill with a knife with a long narrow-shaped blade. Tie the legs of the bird together and then lay the fowl on its back. The mouth is then opened with the left hand and the point of the blade inserted into the slit in the roof of the mouth. A firm, sharp cut is then made into the brain, cutting along its entire length. Then hang up the bird for a short time to allow the blood to run out. Pluck at once. The appearance of the fowl may be much improved by having the legs tied down and the wings twisted behind the back as shown in Figs. 3 and 4.

With proper care and treatment cockerels of Plymouth Rocks, Wyandottes, Brahmas and Cochins at the end of four months should show a weight development of four pounds each or eight pounds per pair. At the end of five months there should be no difficulty in getting them to weigh on an average of five pounds each. With the care, treatment and rations outlined above, combined with the proper breeds to work on, there should be no reason why our farmers should not, with great profit to themselves, supply a large amount of the poultry, for which there is an ever increasing demand in the British markets. They cannot begin the work too soon for their own good and that of our country.

How an English Poultryman Fattens His Birds. Prof. Robertson, in his evidence before the Select Standing Committee on Agriculture and Colonization of the House of Parliament, Ottawa, describes the method of fattening followed by one of the leading and most successful poultry feeders in England from which the following instructive extracts are taken :

"The coops in which the chickens were put for fattening were about 6½ feet long and about 16 inches square inside. Each coup was divided into three compartments, and in each compartment there were five chickens, making fifteen chickens in each coop. The coops were constructed by using sticks or rods, such as we would call slats ; and in some cases small hazel rods such as are used for heavy basket making. A little sliding door in front of each compartment gave a chance for the chickens to be taken out when that was required. The chickens were fed for about three weeks, sometimes a little less, sometimes a little longer, according to the condition of the chickens when received and the activity or dulness of the market. The chickens were fed on oats ground very fine, the hulls being pulverized until they were almost like dust, mixed with skim-milk either sweet or sour, preferably sour. The mixture had a consistency about as thick as thin porridge, so that from the end of a wooden spoon it would drop off but not run. It was fed raw. In front of each coop was a small wooden V-shaped trough. The chickens could put their heads through between the slats of the coop and eat out of it. Sometimes in the morning it was mixed for a day's supply, and sometimes it was fed just after it was mixed. That made no difference. The meal was ground fine ; it did not require much soaking to make it soft. The chickens were fed a small allowance of the mixture three times a day at first. A man took a pail and a wooden stirrer, such as would be made in the country from part of a shingle, and spread the mixture along the "V" trough, three times a day. The chickens were kept hungry during the first week. After that they were fed twice a day as much as they would eat. During the last ten days they were fed a small quantity of tallow in the mixture. The

tallow was melted and mixed with a small portion of meal. That was readily mixed with the bulk of the food. A pound of tallow per day was allowed to seventy chickens at the beginning of the ten day feeding time, and by the end of that the quantity was increased to a pound of tallow for fifty chickens per day.

"Sometime during the feeding period, in his case just before the killing time, the chickens were taken out and a pinch of sulphur rubbed under a wing and under the tail. That is said to be a sure means of killing all the vermin on the chickens. I tried that on chickens covered with vermin, and did not see a single insect on them after the treatment was applied twice. The sulphur seemed also to give a rather nicer appearance to the skin of the chickens when plucked."

Feeding with the Crammer. I put it on twice at an interval of about a week. After feeding the chickens for about a week on the thin mixture three times a day, they were fed for about a week on a thicker mixture twice a day only; and then they were fed during the last week of the fattening period with what is known as a crammer. This cramming machine is simply a hopper or reservoir about the shape and size of a large pail, on a stand about four feet from the ground. At the bottom of the hopper is the cylinder of a pump. That may be about three inches in diameter. The piston rod is connected with a lever to be worked by a man's foot. When the foot is pressed down that pumps the stuff out. At the bottom of the cylinder of the pump there is an opening or small nozzle to which is connected a rubber tube about as large as my little finger and about ten inches long. Different sizes of tubes are used for chickens and turkeys. When the cramming process is begun the hopper is filled. A boy hands out a chicken to the operator. He opens the chicken's beak with one hand, then slips the tube down the throat. The tube is moistened with the food, the mixture being an oleaginous one. One stroke of his foot, with his hand across the chicken's breast gives the chicken its breakfast or its dinner as the case may be. The point is to give the chicken enough, but not so much as to distend its crop unduly. The foot is lifted up and all pressure is taken off the pump before the tube is withdrawn from the crop, otherwise there is danger of choking the chicken by spreading the sticky food up its throat and over the windpipe. When any food remains in the crop of the chicken, it should not be fed. It should be allowed to miss one meal until the crop is empty.

"An expert chicken man with a boy to help him, and in some cases two boys will feed from 300 to 350 chickens an hour. It is not a tedious or expensive operation, nor is it an operation that injures the chickens. The average death-rate at a large fattening establishment was reported as less than a chicken a week where about 5,000 chickens were kept. At one of our fattening stations in Canada the woman in charge took a sickly chicken and nursed it back to strength in a few days by using the machine. The chicken assimilated the food and derived strength from it. There is nothing cruel or brutal in the practice. The chicken did not squawk or try to get away after the third or fourth time of feeding. They seemed to know what was coming and seemed quite willing to accept the dose. The chickens are fed twice a day, morning and night, with the machine. We find in this country that the chickens do better if they get a little water once a day.

Method of Killing. The chickens were killed by having their necks broken. They were not bled, and they were not drawn when sent to market. The object of killing them in this manner is to avoid any mutilation of the chicken. The English buyer is very particular upon this point, and will not buy a chicken that has had its head cut off. Chickens that are mutilated might possibly have been killed by some animal. When the chickens are killed they are taken and plucked when warm. It is not a very tedious operation when one is trained to do the plucking properly, and those employed at this work do it very quickly. A lad told me that each one of the boys would pluck from twelve to fourteen chickens per hour. They plucked them fairly clean only; the pin feathers and down are taken off by the poulterers in the shops. It is almost impossible for those who are not trained to do the work quickly. In any trade or business a person's fingers become more nimble and far more skillful with practice. In some cases a few decorative feathers are left at the tips of the wings. When the chickens are plucked they are put on a shaping board. That may be a board about six inches wide, placed against a wall. The angle formed by the board and the wall on the upper side is about 65 degrees; about one-half the body is above the level of the edge of the board and consequently the blood is drained into the neck. While it is being plucked the neck is hanging downwards and the draining of the blood into the neck goes on. Or it may be a V-shaped trough with about that angle. As soon as each chicken is plucked its legs are laid alongside its breast. The stern of the chicken is struck or pushed against the wall and pressed into the angle of the shaping board or trough. Each bird is laid in with its breast downward, a glazed brick or other weight is laid on top, another brick is put alongside to keep it in position until the next bird is pressed closely there. After the row is full, the chickens are left lying on their breasts with a board laid on top of them, with sufficient weight to hold them firmly and crush the breast bones slightly, but not so as to break them. While they are in this position the body is partly drained of the blood.

which collects in the neck. They are left there to cool and set, and then they are packed in crates and shipped to market. The squeezing on the setting board gives them a more compact shape.

Fattening Crates. The crates or coops in which the fattening was carried on were 7½ feet long by 16 inches square, inside measurement. Each crate was divided into three compartments, and each compartment held four chickens. When the chickens are comparatively small, five may be put in each compartment. The crates were made of slats running lengthwise on three sides—bottom, back and top—and up and down in front. The slats were one inch wide by five-eighths of an inch thick. The spaces between the slats in front should be not less than two inches wide to permit the chickens to put their heads through for feeding from the trough. The slats on the bottom should be put on three-quarters of an inch apart, and the outside slat nearest to each side should be an inch or more from the corner piece. That prevents the corner piece along the inside of the bottom from becoming a ledge to hold the droppings of the chickens. Each compartment has a small sliding door in front.

The crates were placed on stands about 2½ or 3 feet from the ground. The droppings from the chickens were received on sand or some absorbent material.

A light "V" trough, 2½ inches inside, was placed in front of each crate, being carried on two brackets nailed to the ends of the crate. The bottom of the trough was about level with the floor slats of the crate.

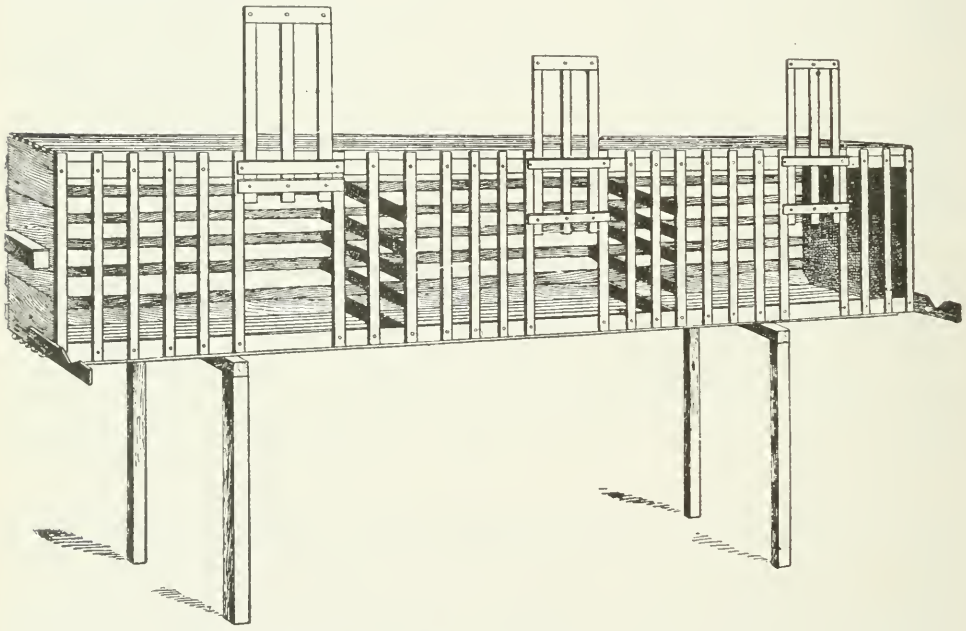


FIG. 6 shows a single crate or coop.

HORTICULTURAL DEPARTMENT.

FRUIT CULTURE.

By Martin Burrell, St. Catharines, Ont.

During the past ten or twelve years fruit growing in Ontario has developed in a way little short of marvellous to those acquainted with the present status of this industry. The professional horticulturist recognizes, with a clearness hitherto unknown, the great importance of producing the highest quality of fruit, and the equal importance of lessening in every possible way the cost of production. Horticulture has been put on a scientific basis. Methods have been revolutionized, and, through Government sources and otherwise, assistance of a practical and scientific character has been extended to those who wanted it. The annual output from Ontario orchards has gone up by leaps and bounds. The consumption of fruit has greatly increased. Increased transportation facilities and lower prices have put fruit of all kinds within the reach of a large percentage of both our urban and rural population. People generally are becoming alive to the fact that fruit is not only a desirable, but a necessary article of food. A few people there may be with whose unfortunate constitutions fruit does not agree, and, on the other hand, there are enthusiastic fruit lovers, who make wild and ill-proportioned claims as to the dietetic value of fruit. It remains true, nevertheless, that the vegetable salts and acids contained in fruit have a high value as correctives, expelling many impurities from the human system, and tending in a marked degree to sweeten and clarify both body and mind.

There yet exists, however, a large class of people who know extremely little in an experimental way of the production or consumption of fruit, and a considerable proportion of these can be found in the farming community. Such people have been deterred from any attempt at fruit growing, either because they were unaware of the desirability and value of fruit in the bill of fare, or from exaggerated ideas as to the difficulties attending its successful cultivation. Another class of people is composed of those who have been growing more or less fruit for their own use, possibly a little also for sale as a side issue on the farm, but who have not given the subject close consideration, and who consequently meet with many discouragements and make many expensive mistakes in the purchase of unsuitable stock, in wrong methods of pruning and otherwise.

The following chapters, which will deal with the cultivation of all kinds of fruits in Ontario, are intended primarily for the classes of people referred to above. They will necessarily include much matter familiar to those who have, to any extent, made fruit culture a special study. It is obviously not within the scope of these papers to discuss at any length the subjects of fungous diseases, varieties, insects, etc. For a fuller knowledge of all these things readers are referred to the Reports of the Ontario Fruit Growers' Association ; to the Fruit Experiment Stations, and to the publications of the Central Experimental Farm, and the Ontario Agricultural College. In the opening chapter on 'General Principles,' questions that affect all fruit alike, such as location, drainage, tillage, etc., will be dealt with, and such questions will be referred to under the separate fruits only when of special importance, or where exceptions to the general rule have to be made.

General Principles.

Climate, Location and Site. One of the first things which determines the success or failure of any particular fruit is the climate question. With great extremes of heat and cold we yet have, through a large part of Ontario, a climate which favours the successful production of most of the fruits belonging to the temperate zone—and fruits of the highest quality. The annual temperature of the different sections of the country will naturally have much to do with the successful production of the different fruits. Occasionally a favorable winter may enable a fruit to be ripened outside its usual northern limit, but the minimum temperature of the average year will determine the question as to whether certain fruits can be profitably grown or not. Thus, where the mercury habitually touches 10° below zero, the successful culture of peaches is practically impossible ; where the point ordinarily reached is from 15 to 20° below, the growing of the sweet cherry becomes a doubtful experiment, and so on with other fruits. In each species of fruit, however, there are varieties with exceptionally hardy characteristics, enabling them to withstand conditions totally fatal to the rest of the species, and it is this fact that makes

the choice of varieties an extremely important point for the planter to consider. Then, within a given district there may be locations so favorable as to enjoy immunity from the more severe frosts affecting the surrounding country. This makes the choice of a site for orchards as important a question as that of selection of varieties. One of the greatest factors in the temperature problem is the proximity to water. A large body of water exercises a marked influence upon the surrounding country. The low temperature of the water in the spring will retard the growth of vegetation, and thus enable the effects of spring frosts to be escaped. In the summer the temperature at night will usually be higher on the lands adjacent to a lake, and in the fall the warmer temperature of the water will lengthen the growing season, and less danger from the early autumn frosts exists. Experience has shown that the most favorable sites for orchards are on lands frequently sloping to bodies of water, and always a little elevated ab ve the surrounding country. This is partly because of the influence of the water; partly from the drainage facilities; and partly because of what is known as atmospheric drainage. It is a fact familiar to most people that the colder air is, the heavier it is, and the low flat areas are usually, therefore, the first to suffer from frosts. Those who are anxious for a clear grasp of this whole question are referred to Bailey's "Principles of Fruit Growing," where the matter is treated at considerable length. With regard to the aspect or exposure of orchards generally, this much may be said :—Near large bodies of water the most favorable exposure is on the slope towards the water. In a district away from water, a northern, or northwesterly exposure is the best, as the blossoming period is retarded and danger from spring frosts escaped. The slope, however, must not be too pronounced, or too cold and backward. Account must also be taken of prevailing winds, and a few words may be advisable here as to the use of windbreaks.

Windbreaks. The value of wind-breaks for the orchard is a much debated question, full of pros. and cons., only a brief summary of the main points will be possible here. The gradual removal of forests in Ontario has rendered the sweep of winds over the farm lands more violent and more noticeable. Winds acquire, to a greater or less degree, the temperature of the area over which they pass, thus modifying the climate of every new district touched. Hence a strong wind from an open body of water will raise the winter temperature of the adjoining land, while wind from a colder area may have a disastrous effect. Wind is a powerful agent in the evaporation of moisture, and, apart from the more rapid evaporation in an open country during the summer, a strong dry wind may have an appreciably bad effect on fruit trees by evaporating the moisture in dormant twigs during winter. The value of a wind-break evidently, therefore, depends on the direction and character of the prevailing winds. Where strong land winds are of frequent occurrence, a wind-break is clearly advisable. To quote from Bailey, "The benefits derived from wind-breaks are, lessening of evaporation from soil and plants; protection from cold; lessening of windfalls, lessening of liability to mechanical injuries of trees; retention of snow and leaves; the enabling of trees to grow more erect; lessening of injury from the drying up of small fruits; retention of sand in certain localities; hastening of maturity of fruits in some cases; encouragement of birds; ornamentation."

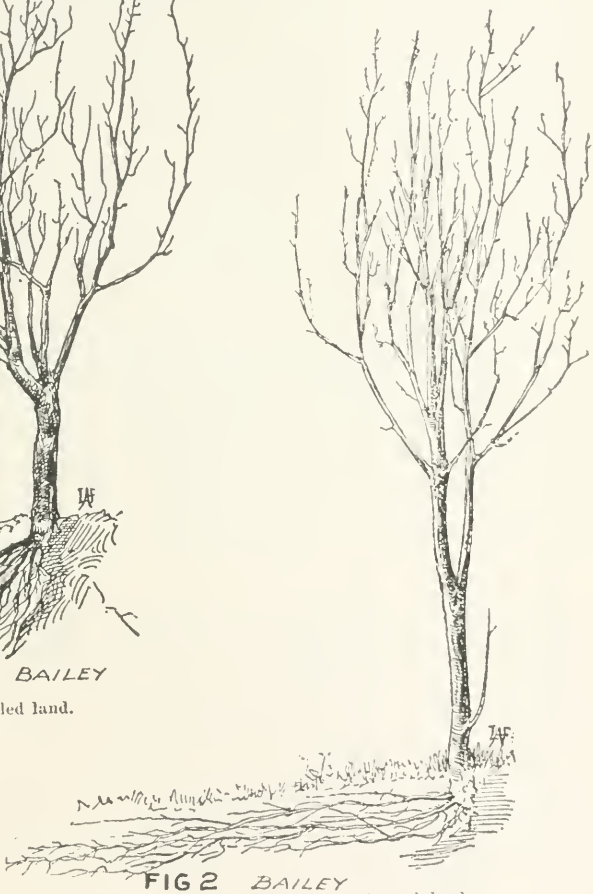
The injuries sustained from wind-breaks are as follows: "Preventing the free circulation of warm winds and consequent exposure to cold; injuries from insects and fungous diseases; injuries from the encroachment of the wind-break itself; increased liability to late spring frosts in rare cases." This is a clear statement of the advantages and disadvantages of wind-breaks, and the evidence is strongly in favor of wind-breaks, unless they are unwisely planted so as to exclude warm winds that are often a fruit grower's salvation during a severe winter. The common objection to wind-breaks, viz., that they harbor all kinds of bad insects and tend to encourage fungous diseases such as mildew, scab, etc., has some strength, but with the intelligent use of a proper spraying apparatus this objection loses its chief force, and care can also be taken that such trees as are especially infested by injurious insects and fungi are left out of the plantation. As a general rule a mixed wind-break is advisable of two or even three rows. It should usually be not too dense, checking the violence of the wind rather than excluding it altogether. Norway spruce, Austrian and Scotch pines are effective; and amongst the deciduous trees those should be used which are most healthy and thrifty in the locality.

The Soil Question. Having decided as to climate, location and exposure, it would become necessary to consider the matter of soils for fruit, and under this head "drainage" and "tillage" will also be referred to. It may be said in the outset that nearly all soils so far as their mechanical texture is concerned will produce with fair success the various fruits, provided that the necessary conditions of fertility, proper drainage and cultivation are fulfilled. The fulfilling of these conditions, however, becomes a somewhat expensive and laborious matter in some cases. And other things being equal, certain fruits will undoubtedly thrive better on special kinds of soils, and even different varieties of the same species of fruit have their soil predilections. So that it is better to ascertain the nature of the varieties to be planted, if possible, before giving them an uncongenial home, The kinds of soil best adapted for the cherry, the pear and so on will be touched on in the chapters devoted to those fruits. Any man who has decided to plant fruit trees of any kind should at once make up his mind that no matter how

good the site, or how valuable the variety, his time and money will inevitably be wasted if his land is not properly drained. Some trees may exist under adverse conditions of this sort, may even partially succeed for a time, but "failure" must be the final word. A porous soil, soils of a sufficient elevation to provide good natural drainage, these with care may give excellent results, but broadly speaking underdraining will always abundantly repay its expense in the case of practically all fruits. Amongst the many benefits derived from the proper system of underdraining are the following: The raising of the soil's temperature; the freeing of all surplus water from the subsoil; the liberation of much plant food, which though in the soil otherwise remains inaccessible to the feeding roots; the making of the soil both moister in a time of drouth and drier in time of excessive moisture. On land well drained the root system of the tree is not only vastly more healthy, but the feeding rootlets commence work earlier; the tree makes a more rapid and vigorous growth, and is in a far better position to develop plump sound fruit

Roots of a young apple tree in rich tilled land.

buds and to ripen its wood for the winter. These are great gains, and under ordinary conditions the orchardist who has once experienced them will not be likely to neglect the underdraining of other lands he intends to plant.



Roots of a young apple tree in sod land.

Tillage. The cultivation of the soil, for centuries regarded as a necessary and common place part of the husbandman's labors, has received so much attention during the last twenty or thirty years that this part of agriculture may now be almost considered a science in itself. To grow certain plants and destroy others which interfered with their growth,—this was the sole object of cultivation in the older days. And even yet there are many whose conceptions of tillage go no further than this. Certainly this is a primary object. But the secondary benefits derived are so great as to cause the whole question to be looked at in a different light. As this matter of cultivation is of even more importance to the horticulturist than to the general farmer,

it may be well to touch on a few points that affect all kinds of fruit alike. Broadly speaking the benefits of cultivation are four :

1. The destruction of weeds, which rob the plants and trees of necessary plant food and moisture.

2. The improvement of the physical condition of the soil, thereby giving the roots a larger feeding ground.

3. The improvement of the chemical condition of the soil, by rendering the decomposition of organic matter much more rapid, and by making locked-up plantfood available to the feeding rootlets.

4. The conservation of moisture.

These are all important points, but cannot be elaborated here. The first benefit spoken of is so obvious that mere mention is enough. Of the third, viz., the chemical improvement, this much may be added. Soil may be really rich in plant food and yet produce inferior crops. "A hundred pounds of potash in a stone-hard lump is worth less to a given plant than an ounce in a state of fine division." The key by which many unsuspected riches in the soil are let out is thorough cultivation. On the second benefit from tillage of fruit trees, viz., the extension of the feeding ground for the roots, a few words may be said. All orchards should be thoroughly cultivated when first planted, and in most cases during their lifetime. The question of leaving orchards in sod when of a bearing age will be touched on under the chapter dealing with the apple. If an orchard is properly planted and carefully cultivated the first year or two the roots will penetrate deeply enough to escape injury from the plow, and the subsoil itself by thorough tillage and efficient drainage will provide a large feeding ground for the tree. On the other hand if these matters are neglected a surface habit of root-growth is formed, which entails severe injuries when subsequent cultivation is attempted, to say nothing of losses in other directions. The differences are very clearly illustrated in the accompanying figures. Fig 1 is that of an apple tree six years old cultivated from the start. Fig. 2 shows the result when neglect has been the order of the day.

The fourth benefit derived from the proper tillage of the soil, viz., conservation of moisture, is, in many instances, the most important of all to the grower of fruit. It is intimately related to the plant-food question, inasmuch as water is the medium through which all plants obtain their food. Nearly all fruits, from apples to strawberries, are composed of about 85% of water. The production of a crop of fruit, therefore, in addition to the building up of the plants and trees, requires an immense amount of soil moisture. Deep plowing and subsoiling will enable the soil to receive more moisture, and the finer the particles of the soil the greater the capacity for holding water, while surface tillage, breaking the crust of the ground provides a mulch which checks evaporation of the moisture received in the spring and from subsequent rains. This statement need hardly be dwelt on. It contain an obvious truth, and so important to the orchardist, that in a dry season it simply means the difference between failure and success.

Manuring. What has been said above about tillage bears closely on the matter of manures. On improperly tilled and undrained lands, a good deal of fertilizing material already in the ground cannot be used by the roots of the trees, and a considerable portion of any that may be added is practically wasted. Speaking generally, land that is in a sufficiently fertile condition to grow good crops of grain or roots, is in condition, also, to grow fruit trees, or produce fair crops of fruit. The demands of the tree upon the soil are, however, of a different character to those made by the fruit. The elements taken from the soil in the growing of trees, bushes, or vines, are in much the same proportion as in the case of many grain and hay crops. Barn-yard manure—to the average farmer the cheapest and most convenient form—conveys these elements, nitrogen, phosphoric acid and potash, to the soil in a fairly satisfactory ratio, besides supplying the necessary humus. The composition of the fruit is distinctly different. In some fruits practically no nitrogen exists, and with all fruit potash is the preponderant element. When fruit trees are bearing there is a diminution in wood growth, and a consequent less urgent call for nitrogen ; and an increased demand for potash to supply the loss occasioned by the removal of the fruit. Unleached wood ashes will provide potash in an admirable form, and with it also a valuable proportion of phosphoric acid. It is much to be regretted that so large a quantity of Canadian ashes are annually exported when the orchards of Ontario are so largely in need of this fertilizer. People who imagine that good crops of fruit can be produced without high manuring would be vastly surprised if they knew the facts. Prof. Roberts, of Cornell, has very carefully calculated the comparative demands on the soil of wheat and apples. Computations of this kind necessarily cannot be exact, but they are approximately true, and are a valuable guide to those who wish for light on the subject.

The plant-food taken per acre during twenty years by average crops of apples, counting also the leaves (but not that taken by the wood), and from one acre of wheat by grain and straw

during twenty years, assuming an average yield of fifteen bushels and seven pounds of straw to three pounds grain is given below.

	Apples. lbs.	Leaves. lbs.	Value. $ c.	Grain. lbs.	Straw. lbs.	
Nitrogen	498.60	456.75	143 30	424.80	234.78	
Phosphoric acid	38.25	126.	11 50	160.20	50.40	
Potash	728.55	441.	52 65	109.80	214.20	
Total value			207 45			$128 23

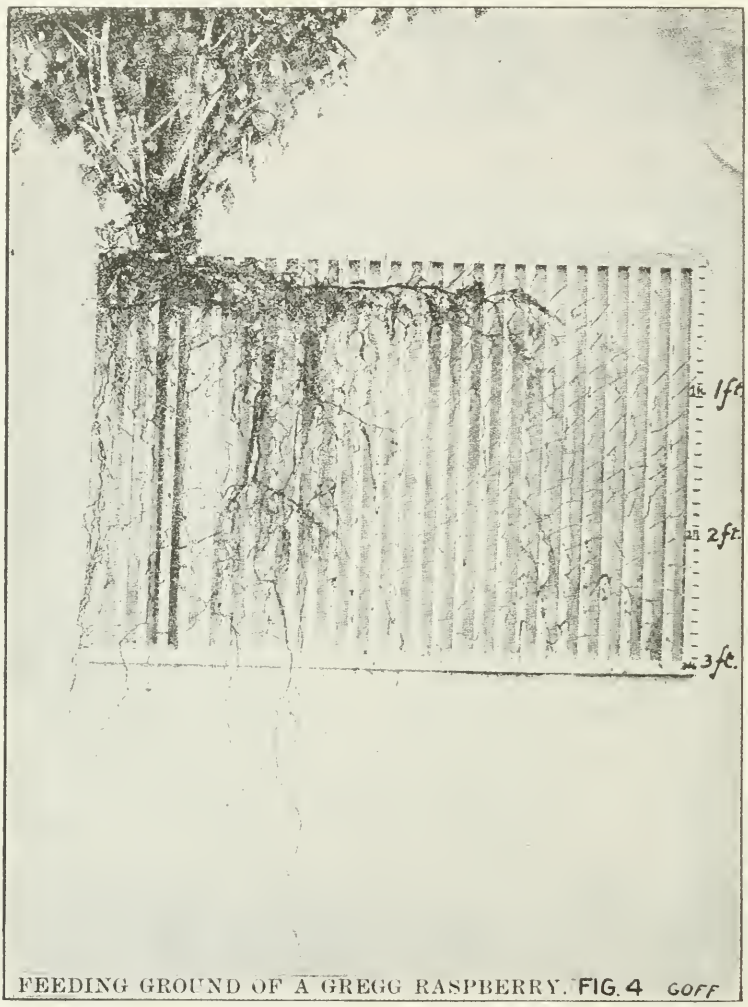
Prof. Roberts adds: "The above tables show that the orchard requires, if fruitful, plant food equal in value to eighty-seven dollars more than the wheat. No one would think for a moment of trying to raise wheat for twenty consecutive years, even though the soil was fitted in the best possible manner yearly."

FIG 3 THOMAS
Faulty Manuring

One more point regarding the manner of manuring orchards should be emphasized. The practice of piling the manure, or placing ashes round the tree is common, and is based on a radical misconception of the nature of the root system. Fig. 3 illustrates the point in question. In many trees, as growth advances, the main root is lost in laterals. From these laterals are developed small fibrous roots, and from these again minute root-hairs which convey food and moisture to the tree. It has been accepted generally as true that the roots of a tree extend as far as the branches. As a matter of fact they extend a vast deal farther, often three times the distance, so that at the ordinary distance of planting there is probably not a square yard of soil in the orchard not

FIG. 5 Roots of a young pear tree in hard, unpleasant soil. BAILEY

occupied by these feeding rootlets when the tree is of a bearing age. Fig. 4 shows the extent of ground occupied by the roots of a black raspberry, and Fig. 5 is a reproduction of the actual root-system of a young pear tree. Prof. Bailey laid bare two roots on the one side of this tree,



FEEDING GROUND OF A GREGG RASPBERRY. FIG. 4 GOFF

and they extended twenty-one feet. Assuming that the growth on the other side corresponded, the total spread would be forty-two feet, while the spread of the top of the tree was but seven feet. It will be readily seen, then, that the even spreading of manure over the whole of the orchard is distinctly the right practice.

Laying out the Orchard. In the laying out of a fruit plantation the appearance of the orchard is far better, and the necessary work is far more easily performed, if the rows are straight and the trees at even distances. Of the many methods of laying out, one of the simplest, and one in which the greatest accuracy is obtainable, is the following, illustrated by Fig 6.

Take a long wire, No. 12 will usually be the right size, (in small orchards a cord will do) and mark off the required distance on it, either by a scratch of a file or by tying on a piece of waxed thread. Let each end of the wire be attached to a strong stake. A B C D represents the field. Measuring the distance from the fence where the first row of trees is to start, stretch the base line F to G placing a small stake at each mark on the wire. Take up the wire and in the same way stake out F H and H I. The wire is then simply stretched from J to K and so on down the field, staking out as before. Quite small stakes, a few inches long will do, as no sighting is required. With this plan a planting board as in Fig 7 is necessary. Take a strip

five or six inches wide, and about six feet long, cut out a notch in the middle of one side and bore holes through the ends at exactly the same distance from the notch. The notch should be about the size of the tree When all is ready for planting, the board is placed so that the notch fits round the stake, pegs are then put through the holes, the board lifted up over them, the hole dug, the board is then replaced on the pegs and the tree placed so that it fits into the notch. If haste is necessary one man can go ahead with a duplicate board and a supply of small pegs, digging the holes and leaving the pegs for the guidance of the planter.

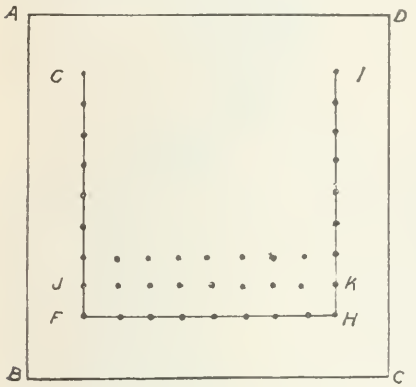


FIG 6. STAKING OUT

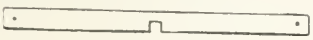
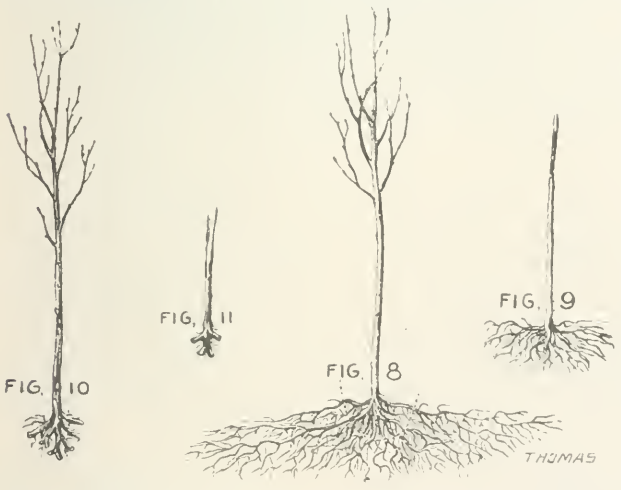


FIG. 7

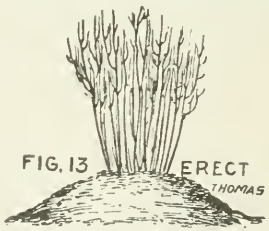
Selection of Trees and Planting. With all trees a medium-sized healthy tree with good fibrous roots is to be preferred to larger and older stock. If possible it is better to buy the trees from some reliable nurseryman in your own locality. Trees will then not run so many dangers in transplanting, and the purchaser may often see them dug himself. It makes a considerable difference as to how trees are dug from the nursery row, and there is always gross carelessness in this respect. Fig. 8 represents the tree as it stands in the nursery row. In Fig. 9 is seen a tree dug as it should be, with a fair proportion of the fibrous roots. Fig. 10 is an example of too many of the trees sent out, and Fig. 11 represents the worst form.



In Ontario generally, and with nearly all fruits, spring planting is preferable to planting in the fall. Most nurserymen, however dig the trees in the fall, and the purchaser is often in a better position to buy them then, and they can be 'heeled in' for the winter with with little trouble or risk. A place where the ground is mellow and well drained should be selected, the bunches of trees should be opened up and the earth well packed in among the roots. If mice are likely to bother, heel in the trees in an erect position in a sheltered place. Otherwise a sloping position as in Fig. 12 is better, with earth covering a good part of the stem.

When trees are received from the nursery in the spring they should also be heeled in carefully till wanted. Too many trees are lost from a neglect of this practice. Any trees received with very dry roots should be placed in water for a time, or better, in mud. In planting, and this applies to all trees and bushes alike, the holes should be dug large enough to take in the roots without cramping, a few shovelfuls of moist and mellow top soil packed firmly round the roots, the hole filled in and firmed thoroughly to within a couple of inches from the top, where the dirt

should form a loose mulch. Manure or fertilizers should not be put in direct contact with the young roots. The firm packing of the earth is very important. The trimming of the tops of the newly-set trees will be spoken of later, as different methods apply to the various trees, vines and bushes; but in all cases the bruised and torn roots should be trimmed off before planting, and exceptionally long roots may be cut back to correspond with the rest of the system.



The Variety Question. This important phase of fruit culture is one upon which endless questions are asked, and upon which advice is often a difficult and dangerous matter. The man who plants for his own use requires, in addition to hardiness and a fairly productive habit, high quality in the fruit. He who is planting for commercial purposes will rate productiveness and a showy appearance far higher than quality. The question is more complicated from the fact that local conditions have a strong effect on the behavior of varieties. To such an extent is this true that a variety successfully grown in one district may be almost worthless on different soil and with a slightly different climate. Any varieties named in the following chapters will be such as have been tested under a good many conditions and over a large extent of territory. A few suggestions may be offered to intending planters. Do not buy largely of any variety simply on the recommendation of the nursery agent. Nurserymen, it is true, try to grow chiefly the varieties that are most called for, but they naturally propagate new varieties to a considerable extent, and also have a natural preference for varieties that grow easily and thriftily. The nurseryman is only human and he very reasonably, therefore, pushes the sale of his surplus stock. If that surplus consists of undesirable varieties somebody will eventually be hurt. Lots of our nurserymen are honorable men, well posted in their business. The purchaser is safe in such hands. But to buy from an irresponsible agent, varieties of which the purchaser knows nothing, simply from the glowing description given by the seller, is courting disaster, indeed. Eschew new varieties except to a small extent for testing purposes. Ninety-five per cent. of the new varieties come on the market with a flourish of trumpets and descend to an inglorious grave within a few years. Let the intending purchaser make up his mind what kind of tree he wants—hardy, productive, early, late or what not—and then if the requisite qualities are claimed for any particular kind, find if such variety has been tested in his district. If it has not it would be wise on his part to enquire about it from the Horticultural Departments at the Central Farm, Ottawa, or the Ontario Agricultural College, or write to the nearest fruit experiment station.

Insects and Fungi. Nobody who takes up fruit culture, even in a small way, can expect to achieve success without some knowledge of insects and fungous diseases. In the Farmers' Institute Report for 1896-7 will be found a capital outline of entomology, written by the late Prof. Panton. Anyone who carefully refers to that article will be able to get a good grasp of the subject. The bulletins issued by the Department of Agriculture entitled "Instructions in Spraying" touch on insects also, as well as the various fungi, such as apple scab and grape mildew. Spraying, though not always a sure cure, will generally successfully control our insect and fungous pests. Success, however, will not be achieved unless there is a right understanding of the nature of the enemy, and prompt and thorough measures taken on the grower's part. Neither the amateur nor the professional can afford to produce fruit of an inferior kind, and it will be a red-letter day for Ontario when her fruit-growing population realizes the fact.

The Apple.

After all that may be said in favor of pears, plums and peaches, the apple, as far as Ontario generally is concerned, must remain the king of fruits. The keeping qualities of this fruit, the durability of the tree and its adaptability to so wide a range of climate and soil will always make it the staple amongst fruits. It has been demonstrated over and over again that the apple orchard, thoroughly cared for, will be one of the most profitable parts of the farm. Apple growers, generally, are becoming alive to the fact that, with proper methods of grading and packing, the market is practically limitless, and no intelligent man need feel uncertain as to whether or not the planting of an apple orchard will be a profitable investment.

The Soil. The apple will thrive on a greater variety of soils than, perhaps, any of our fruits. Hard, shallow and wet lands must, however, be avoided. As long as the soil is porous and friable, and the subsoil not too compact, success can be achieved on all soils from sand to clay. Thorough preparation of the soil before planting must be insisted on. It is better to

plant on land previously occupied by hoe crops, such land being usually both cleaner and in a better mechanical condition. A clover sod plowed the previous fall and thoroughly worked in the spring will also be satisfactory. The site should have a northwesterly or northerly exposure. These matters have been referred to at greater length in the opening chapters on 'General Principles'

Buying the Trees. It is usually best to purchase the trees in the early fall, but with the stipulation that they shall not be removed from the nursery row till the leaves have fallen and the wood ripened thoroughly. The subject of fall or spring planting is a much discussed one, each plan having its advantages. There is often more time in the fall to do the necessary work, and if the fall planted tree gets thoroughly established it will no doubt stand a dry summer better than the tree planted in the spring. But the question of the tree ripening its wood before being dug is important. Young trees planted in the fall with wood not matured, when subjected to the severe cold and drying winds of winter, will be hardly likely to survive. In the colder districts the fall planted tree will in any case have a trying time the first winter and on the whole the consensus of opinion is decidedly in favor of spring planting. Select nothing but well-grown, clean-barked, healthy trees. If any dark discolorations show, where limbs were pruned off the previous year, it indicates poor constitution and the tree should be rejected. Such trees may have what is called "black heart," and will rarely develop into good specimens of the vigorous thrifty kinds. A tree two years old from the bud or graft is to be preferred to older stock. In any case do not plant a tree more than three years old. The younger tree will usually have a more fibrous root, and in nine cases out of ten will outgrow the older stock. Reject also any trees having root-galls, such as are illustrated in Fig. 14. Though little is known of these gall growths, there are grounds for suspecting their contagious, character, and it is safer not to plant affected trees.

FIG. 14
Root-galls upon apple trees from a nursery. BAILEY

Pruning. As the matter of laying out the orchards and planting were dealt with under "General Principles," it may be assumed now that the tree is planted, and the question is,—how prune? If the average orchardist realized the importance of early pruning, of careful and systematic shaping of the tree during the first few years of its life, there would not be so much injurious slashing and butchering of bearing trees. Directly the tree is planted its future shape and habit should be formed to a certain extent. Severe cutting back has got to be accomplished with the newly-planted tree that the top may correspond with the shortened roots, but let the cutting back be on some system. There are two types to be aimed at, the one represented in Fig. 15, of the open and spreading character; the other in Fig. 16, that where the leading shoot of the young tree is trained up. This latter plan gives a stronger

FIG. 15 OPEN CENTRE SYSTEM BAILEY

and better tree, but the form is not practicable with all varieties. In such a plan the leader is selected and trained from the start as in Figs. 17 and 18, the other branches being shortened

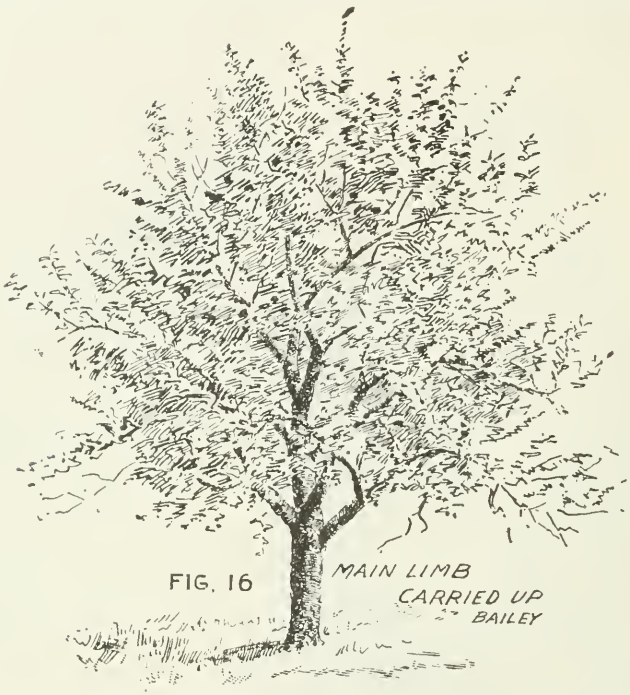


FIG. 16

back so as eventually to form a well-balanced head. In the other plan three or four branches are allowed to form a head and the centre is kept more open. Great care should be taken in shaping the top, not to allow the formation of a crotch. A tree of that kind will be likely to come to grief in a high wind or under a big load of fruit. The branches should be taken alternately so as to alllow the strain to be divided and not to fall on the main crotch. See Fig. 19.

The head should start about four feet and a-half from the ground, Figs. 20 and 21 showing the shortening back process of a young tree which had got too tall.

During the first summer's growth, if proper care is exercised and undesirable shoots pinched off, the tree (Fig. 19) will, by the fall, be like that in Fig. 22, which may be considered a well formed head. When the general shape of the top has got well established, and this should be done by the end of the first three years, all the pruning required will be the removal of limbs that cross or rub each other, or that make the head of the tree too dense. The best time for pruning in Ontario is probably at the close of the winter, and just before the sap starts. By systematic work, as suggested, a sharp knife will do all the pruning, and the tree will be spared the shock of losing large limbs. It is necessary, however, sometimes to take off good-sized branches, and there is a right way and a wrong way of accomplishing such work. The wrong way—often practised—is to saw off the limb, leaving a stub of wood sometimes several inches long Without going too deeply into this question it may be said briefly that the healing of a wound is entirely dependent on the flow of the cambium, or sap, layer. The following illustrations from Prof. Bailey's excellent publication, "The Pruning Book," will point the moral and adorn the tale. A limb removed as in Fig. 23, simply means the existence of a dead stub, through the base of which rot is likely to attack the tree. Fig. 24, where the limb is cut close to the tree, shows that the healing process from the flow of the cambium layer is rapidly taking place. Large limbs should be removed just before growth begins, and the wounds should be coated with paint. But, most important of all, "*the cut should always be made close to, and perfectly even with, the outline of the trunk, without regard to the size of the wound made.*"

Cultivation of the Orchard. In the chapter on "General Principles," this matter has been treated at some length, but the question arises, what crops may be grown in the orchard till it reaches bearing age? Grain and hay should certainly *not* be, as, apart from the

plant food they take from the soil, the amount of moisture they rob the trees of is incredible. If such crops are grown, there should be a space of at least four feet of cultivated ground next the tree row. The best crop for the young orchard would be root crops, potatoes and corn, and every year the trees should have more room. Figs. 1, 2 and 5 show how extensive is the root system of trees, and it should be remembered that unless very high manuring and thorough

FIG. 17. Second-class apple tree, showing leader at A

FIG. 18. BAILEY Second-class tree, showing leader at A

FIG. 19 Figure of thinned and shortened-back young tree.

FIG. 21 The same, after the operation is completed.

FIG. 20 THOMAS —Mode of Reducing the Height of a tall young tree by cutting at the dotted line

FIG. 22 THOMAS —Well-formed Head

cultivation are given the trees must inevitably suffer if the roots of other crops are extending over their feeding grounds. After the trees are in bearing it would certainly be wiser to give the trees all the ground, keeping the ground cultivated with the harrows or cultivator. About August 1st, when growth has ceased, it is a good plan to plow up to the trees and sow crimson clover, rye, or some other cover crop, to take up the root moisture which might induce an undesirably late growth in the trees, and to form a protection for the winter. Such a crop, however, should be plowed under very early in the spring, not left to evaporate moisture and be plowed under with more or less injury to the feeding roots of the trees. As to the question of sod in the apple orchard, it might be confidently said that the best and most successful orchardists are unanimously against the practice. Insects and fungous diseases are usually worse in such orchards. They seldom get what they should, viz.: a generous top dressing of manure,

and, worst of all, there is an increasing tendency towards a surface habit of the roots. Fig. 2 shows where the roots are in sod. In a dry season such trees decidedly suffer, and, if left too long in sod, the eventual plowing becomes a difficult and very destructive process.

FIG. 23.
Improper cutting of a limb

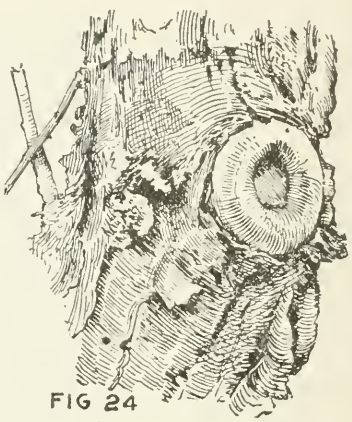


FIG 24
Proper cutting of a limb.

As to the distance in planting something depends on the nature of the soil and the locality. With vigorous growers and a good soil forty feet apart is better than a less distance. From thirty-five to forty feet will be none too far, if every care is given to the orchard. The latter distance will pay for itself by the additional convenience in spraying, cultivating and picking, and by the improved quality of the fruit.

Thinning has not been touched on, though it will be dealt with fully under the peach. The thinning of apples has been successfully attempted in New York and Massachusetts. The work was done by hand, and at a cost on large trees of from 30 to 80 cents a tree. With good varieties it would undoubtedly pay where the trees were loaded, inasmuch as it would not only increase the size of the fruit and lessen the drain on the tree's vitality, but it would largely do away with the 'off year' which is simply a result of overbearing.

Varieties. For a specialized list, suited to the various counties of Ontario, readers are referred to pages 141 and 142 of the report of the Ontario Fruit Growers' Association for 1893.

For the coldest sections of the Province the following may be recommended :

Summer. *Yellow Transparent, Duchess.*

Autumn. *Gravenstein, Alexander, Wealthy.*

Winter. *Pewaukee, Scott's Winter, Golden Russet.*

For the milder districts.

Summer. *Yellow Transparent, Duchess.*

Autumn. *Gravenstein, Colvert, Wealthy, Ribston Pippin, Fameuse* or *Snow.*

Winter. *Northern Spy, Baldwin, Ontario, Greening, Cranberry Pippin, Golden Russet, Blenheim Pippin, Stark* and *Ben Davis.* The two last need not be included in a list for home use.

Fungi and Insects. The insects chiefly attacking the apple are the codling moth, the canker worm, tent caterpillar, the borer, the oyster-shell bark louse and the apple louse. Instructions on the methods of fighting these pests will be found in the 1896 and 1897 report of the Superintendent of Farmers' Institutes, pages 180 196.

Apple Scab—Fig. 24 A—Leaf blight, canker, etc. are referred to in the Government Bulletin "Instructions in Spraying." A careful examination of the report of Superintendent of Spraying will convince orchardists that apple-scab can be successfully controlled by faithful and intelligent work.

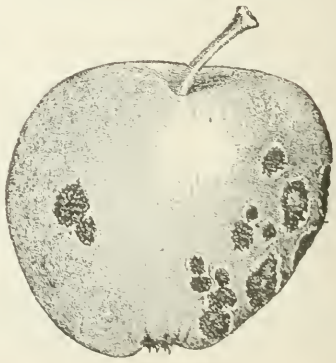


FIG. 24A Apple-scab.

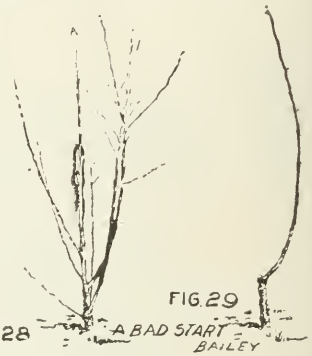
THE PEACH.

While a few hardy varieties may achieve a partial success in colder districts, the culture of the peach is not likely to be satisfactory where the thermometer habitually registers more than 10 degrees below zero. In Ontario the counties of Lincoln, Welland, Monck, Wentworth, Essex and Kent include the areas where peach growing is likely to be permanently profitable, and even many sections within these counties present conditions essentially unfavorable. A winter like the past, when, during February (1899), the thermometer in these districts several times touched a lower point than that mentioned, plainly demonstrates the truth of the statement.

PRUNING AT END OF TWO YEARS.

Planting and Pruning. The trees to be planted should be thrifty and straight, one year old from the bud. The process of planting has already been described. The mark where the old stock was cut off and the bud grew from should be at a level with or slightly below the surface of the ground. Before setting, the young tree should be carefully examined for the peach borer, which may often be found on nursery stock; and for root galls, which are somewhat similar to those on the raspberry and apple. See Figs. 90 and 14. Trees with galls should be rejected. The head of the young tree should be started at from $2\frac{1}{2}$ to $3\frac{1}{2}$ ft. from the ground. If lower than this, there will be difficulty in cultivation, from the inevitable spread of the lower limbs; and if higher, picking will be less easy and a top-heavy tree will be the result, which will be put to a severe test in high winds and under a heavy load of fruit. There are two systems of pruning the peach, both of which have strong advocates. In the one case the previous

year's growth is shortened in one-half every season, a bushy and comparatively low head being attained. In the other system the inner wood is thinned out and the head is more open, with the branches following their natural growth. Whatever system is followed, the pruning is the same the first year or two, while the head is being formed. Figs. 25 and 26 show the method of treating the tree when planting. Fig. 27 illustrates the second year's pruning, enough branches being left to form a spreading vigorous head. Occasionally a top will die back or fail to produce good growth from the upper buds. In such a case it is better to select the strongest of the young shoots and make a fresh trunk. Figs. 28 and 29 will illustrate the point. The shortening in system has a tendency to produce a stocky growth with a greater amount of bearing wood. The shortening in, however, is in itself a thinning process, and when a comparatively small proportion of live buds remain after a severe winter, too much of the crop may be thus pruned off. After the trees attain a considerable size the practice is seldom followed, partly from the expense and partly because of the less vigorous growth of the tree. As long as dead wood is removed and broken, and crowded limbs pruned out, the actual method of pruning is of far less importance than the proper manuring and cultivation of the orchard.



PRUNING BY THINNING OUT.

Fig. 30 is an example of the open-made tree, with branches following the natural growth.

In Fig. 31 is illustrated the system of pruning by shortening in. This is from a photograph of a three-year old tree of the variety Hyne's Surprise.

In Fig. 32 is seen a three-year old peach, taken on July 26th. These trees have also been regularly shortened in.

Soil and Location. Many of the remarks made under "General Principles" will hold good in the case of the peach, but proximity to a body of water is of more importance than the kind of exposure. The ameliorating influence of a large body of water is so great and, with the peach, a few degrees of winter temperature one way or the other is often so important a matter, that the point should be allowed great weight in the choice of a location Speaking generally, a soil that is very good for corn is the best peach soil. A fairly light, warm and deep sand is probably most suitable, and especially if the sub-soil is gravelly or of a fairly porous character. The peach, of all trees, demands a well drained soil, and with no kind of fruit will underdraining pay so well.

Distance of Planting. Growers differ widely as to the appropriate distance between peach trees; as near as 14 feet, and as far as 20 feet apart being advocated. The trees in the famous Hale orchard are only 13 feet apart, but the most thorough pruning and manuring are practised, and the plan is not generally advisable. When spraying, cultivating, proper ripening and coloring of the fruit are all taken into account, it will be found that a generous space between the trees is preferable. At least 18 feet each way is strongly advised.

Cultivation. To secure the best results the cultivation of the peach must be thorough and constant. No tree will so soon suffer from neglect in this respect. Hoed crops alone should be allowed in the peach orchard, and these should be discontinued after the third year. The practice of growing berries between the trees can only be followed at the expense of the trees. For the first two years strawberries might be allowed, but the amount of moisture evaporated by the plants and fruit is incredible to those who have not studied the matter, and there is always the tendency to crowd in on the tree rows. If raspberries are placed amongst the peach trees one row is enough with a row of roots or potatoes each side. The root system of the raspberry has been illustrated in Fig. 4, and with two rows of raspberries between trees, even eighteen feet apart, it will be found that by the third year the roots of the trees and the berries

are fighting in the same soil for moisture and food. Nothing but the highest manuring and cultivation under such circumstances can put the trees in first-class condition. Towards the end of July the ground may be plowed to the trees and a cover crop, preferably mammoth clover or crimson clover, sown. The writer has had excellent results with the latter, even a severe winter like that of '98-'99 leaving enough of the clover to plow down in May and add much humus and direct plant food to the soil.

FIG. 32

Manures. The manuring of the earlier years of a peach orchard should be similar to that of the apple orchard. When the fruiting time comes the tree takes up large quantities of potash, and a dressing of seventy to eighty bushels per acre of unleached ashes will be profitably applied. If ashes are not conveniently obtained, muriate of potash will be the best form to apply the potash in. The commercial muriate usually contains about 50% of actual potash, and a dressing of some 400 pounds to the acre would be a fair equivalent to the amount of ashes suggested. If the muriate is used a dressing of phosphoric acid in the shape of bone meal or phosphate should also be applied. The grower must decide these questions for himself. Briefly, when the trees are fruiting and at the same time the foliage is a healthy green and a fair growth of new wood is being made, the orchard has enough nitrogen and the manuring should be in the direction of potash and phosphoric acid. If, however, the growth is at all feeble and the foliage sickly, nitrate of soda—150 lbs. to the acre—or barnyard manure should be immediately applied.

Thinning. This is so important a feature of successful peach culture, and the practice of thinning is so little followed, that a few remarks on the subject will be in order. Thinning lessens the strain on the vitality of the tree, the strength of the tree going not to the pulp but to the seed. It allows of a more even distribution of the fruit and thus saves a frequent breakdown. It increases the size of the fruit. It diminishes the danger from rot. As far as the labor of thinning is concerned it is a comparatively small affair. From ten to twenty cents a tree would cover the expense, and if the tree is not thinned there is the extra labor to be faced in picking the additional number of peaches at the time of maturity. The fruit should be thinned when the size of small hickory nuts and left not less than three or four inches apart.

The profits from such a process are large and undoubted, as all growers who have tried it will testify. For fuller information on this point readers are referred to the excellent bulletin by Prof. Craig, No. 1, Second Series, of the Central Experimental Farm.

Varieties. Local conditions must decide the variety question to a large extent. Of the earlier kinds two of the best commonly planted are *Early Rivers* and *Hyne's Surprise*. Next in order of season come *Yellow St. John*, *Mountain Rose* (white), *Early Crawford*, *Reeve's Favorite*, *Elberta*, *Old Mixon* (white), *Late Crawford*, *Wager*, *Smock* and *Steven's Rareripe* (white).

Diseases and Insects. Chief among the diseases in point of destructiveness comes the "yellows." The origin and exact nature of this disease are unknown. It is highly contagious, and will ordinarily destroy a tree in three years. Though an Ontario statute provides for its destruction the law is often a dead letter owing to the apathy of the local authorities. The wise

FIG. 33.

man will take out at once and burn any tree showing symptoms of this disease. The premature ripening and spotted appearance of the fruit is a sure sign, and the sickly yellow foliage and wiry growths shown in the three central twigs in Fig. 33 will enable the grower to diagnose the case. Each outside twig in this figure is a normal twig.

Leaf-curl is a highly injurious fungous disease affecting the peach. Fig. 34 shows the typical appearance of a diseased twig.

FIG, 35
Effect of soft rot. *Monilia.*

Three remedies exist for this trouble. Spraying with Bordeaux mixture, once before the blossoms open and once after will do much to control it. Whale oil soap, one pound to the gallon, has been thoroughly effective in Ohio, applied immediately before the bursting of the buds; and using a whitewash as a winter spray. For the last remedy readers are referred to the Bulletin of the Ontario Agricultural Department "Instructions in Spraying."

Rot or Monilia. This fungus, which also affects the plum and cherry, is worse on early varieties and in a wet season. In gardens where only a few trees are grown the affected specimens should be picked off and destroyed. A systematic use of the Bordeaux mixture will check it to a considerable extent.

The two most injurious insects to the peach are the curculio and the peach-borer. Paris green, four ounces to forty gallons, with a pound of lime added, will check the former. A thick wash composed of cement and skim-milk applied early in July will also be effective, and will prove more adhesive than any other wash.

The Pear.

This excellent fruit, so generally and deservedly esteemed, should always secure a prominent place in the orchard of the commercial grower and in the amateur's garden By a judicious selection of varieties fruit can be enjoyed from August till January. It was one of the few fruits successfully marketed in England in 1898, and a profitable trade in that direction might be built up if the right varieties are grown and the packing carefully done.

Soil. The soil conditions favorable for the apple are equally favorable for the pear. On a wet soil it will soon become diseased and sickly. As long as the subsoil is fairly porous and dry the tree will thrive and produce fruit of excellent quality on moderately heavy clay. In short, if the drainage is good and the ground tolerably rich the pear can be successfully cultivated in almost any soil from sand to clay, though a strong clay loam may be regarded as the best type of soil.

Selection of Trees, Planting and Pruning. There are two types of pear trees commonly grown—standards and dwarfs. With the standard sorts the variety is grafted or budded on pear stock, and trees of this kind will last a life-time. To render the tree of a dwarf habit the quince stock is used This allows of a much closer planting, twelve or fourteen feet apart, while the standards should not be nearer than twenty. The quince stock creates an early bearing habit but the tree is comparatively short-lived. Some varieties succeed better on quince stock, even the flavor improving. The most notable are *Duchess d'Angoulême*, *Beurré Diel*, *Easter Beurré* and *Louise Bonne de Jersey*. Two-year old trees are dicidedly preferable to three for planting ; the root of the pear is not very fibrous at any time, and, as trees are usually dug in the nursery (see Figs. 8, 9, 10), the older the tree the less of the fibrous roots left. Planting has been fully described already. Figs. 36, 37 illustrate the manner of pruning back

Pear tree.

The same pruned.

A bad-formed tree.

The tree pruned

the newly set standard tree. As the limbs of the pear have a more upright habit of growth than those of the apple, the head may be started somewhat lower, and the shading of the trunk will lessen the danger of sun scald. The subsequent pruning of the pear consists in thinning out the head, removing any lower sprouts and shortening any very rampant growths. In pruning back these strong twigs cut close to an outside bud, the tendency being then to grow a more spreading top. Dwarfs are grown on the pyramid system or the "inverted cone" plan, usually the latter. The head should be started lower and pruning be constant and systematic. Fig. 38 represents a tree cut back in the second year, a well branched head and no bad crotches. Fig 39 exemplifies a poor type of dwarf pear, where sufficient care has not been given to the formation of the head. A better type is seen in Figs. 41, 42, and the requisite pruning clearly indicated.

The manuring and tillage of the pear orchard should be similar to that of the apple orchard. Cultivation should not be kept up late with young trees or a rank growth is induced, especially on rich soils, in which the wood may fail to ripen, and winter killing and blight will probably

A Duchess dwarf pear, four years set.

The tree pruned.

result. Old trees of the "choke-pear" variety may be profitably grafted with better kinds. Figs. 43, 44 show the process. The old top, as in the case of grafting large apple trees, must be gradually reduced and not all taken off in one year. A tree over sixty years old of this kind on the writer's farm, had about seventy grafts of Bartlett and Beurré Bosc put in some years ago. A fair proportion of the grafts took, and many baskets of fine fruit of these varieties have since been gathered.

Varieties. In the choice of varieties consideration must be given to the structure of the blossom. Some varieties are almost self-sterile, and should be intermingled with varieties having an abundance of pollen. Among those more or less self-sterile are *Anjou, Bartlett, Clapp, Clairgeau, Lawrence, Louise Bonne, Sheldon and Winter Nelis.* Self-fertile varieties include *Duchess D'Angoulême, Beurré Bosc. Beurré Diel, Flemish Beauty, Keiffer, Seckel and Tyson.* In the coldest districts of Ontario pear culture can hardly be successful. One or two Russian varieties might be tried, and the Central Farm Horticultural Department, Ottawa, will give full information on this point. If it is desired to plant a few of the better kinds, the following are suggested for trial : *Flemish Beauty, Anjou, Keiffer, Clairgeau* and *Clapp.*

For sections where the sweet cherry succeeds, and the finer kinds of Domestica plums, the following list is suggested in order of season ; *Clapp, Tyson, Bartlett, Flemish Beauty, Duchess D'Angoulême, Boussock, Beurré Bosc, Beurre Diel, Beurré D'Anjou, Beurré Clairgeau, Keiffer* and *Lawrence.* For home use *Rostiezer, Sheldon* and *Seckel* must be added—three varieties of the highest quality. In a commercial orchard it is doubtfully wise to have many varieties. In southern Ontario a good short list would be *Bartlett, Bosc, D'Anjou, Clairgeau, Keiffer* and *Lawrence.*

In the culture of pears for the home use, it should be added that, to secure the highest flavor, the fruit should be picked when the stock parts easily from the stem on lifting the pear, and ripened indoors. The winter pears should be kept in a cool dry place until about ten days

from the ripening time, at which time all pears should be placed in a room with a temperature of from 65 to 70 degrees.

Diseases. Blight.—This bacterial disease is the most serious drawback to pear culture. The life-history of this malady has been thoroughly explored and described. The disease usually effects an entrance into the tree through the blossom or the ends of the young twigs, penetrating to the lower part of the branch and often communicating itself to many of the larger limbs. If all affected wood is not promptly cut out and burned, enough of the bacteria will survive the winter to spread the trouble broadcast next year. It has been often suggested that putting the orchard into sod will minimise the danger. The evidence is, however, very contradictory on this point, and there are manifest disadvantages attending the practice. The more sod the less fruit, as a rule, and the fruit on the cultivated ground is invariably larger. The better way is to avoid heavy manuring of non-bearing trees, and late cultivation, and choose varieties which are more or less resistant. *Clapp's Favorite*, *Souvenir de Congress* and *Bartlett*, especially the first, are highly subject to blight, while *Keiffer*, *Seckel*, *Tyson* have rarely suffered. This is a question which the intending pear-grower would do well to study closely.

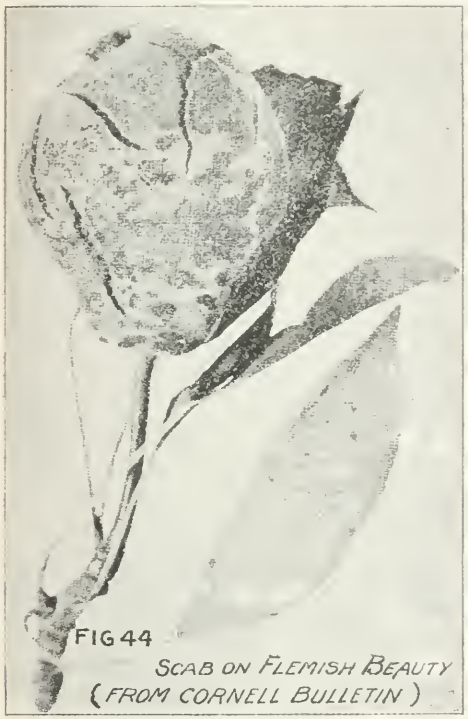


FIG 44
SCAB ON FLEMISH BEAUTY
(FROM CORNELL BULLETIN)

Pear-scab.—See Fig. 44. Though distinct from the apple-scab fungus, it must be fought in the same way and by the same means.

Insects. The curculio, codling-moth and pear-slug are the commonest insect enemies of the pear. The two first have been referred to. The pear-slug is described and remedies given on p. 176 of the 1897-97 Inst. Report.

The Plum.

Nothing need be said as to the claims of this fruit on the amateur or commercial grower. The productiveness and hardiness of the tree, and the many good qualities of the fruit, speak for themselves. From the three types now cultivated, the Domestica or European, the Japanese and the native American class, can be selected varieties that will be successful in all parts of Ontario. It will survive conditions fatal to many other fruits, but will abundantly repay careful attention and high culture. Like the pear, it may be profitably grown on all kinds of soil, but will succeed best and give the highest quality of fruit on heavy ground. Strong clay soils, properly drained, will be found perfectly suitable.

Planting and Pruning. The planting and pruning of the first three years are much the same as with the apple. Fig. 45 indicates the manner of pruning the young tree. This, however, is a two year old tree, and with all the vigorous varieties it is far better to plant one year old trees. Such stock is cheaper, the root will be more fibrous than in Fig. 45, the losses in planting will be less, and in a few years' time it will catch up or surpass the older tree. Fig. 46 is a picture of a block of young Burbank

FIG 45 BAILEY
Young plum stock well trimmed.

trees planted on a rather hard clay soil in the spring of 1897. The trees were strong one year olds, were cut back to a whip about three feet high. Not a tree was lost, and the whole block is exceptionally thrifty. The head of the young tree should be kept fairly open, and the vigorous growths may be shortened in one-half. Some growers practise the shortening-in method year after year. This may be done to advantage with vigorous and erect growers like *Pond's Seedling* and *Bradshaw*, but as soon as the tree bears, these long growths will be checked naturally, and after the head is once formed it is questionable if any pruning is advisable beyond the thinning out of crowding shoots, and the removal of broken or injured branches.

Manuring and Cultivation should be the same as with other fruit trees. When the trees are bearing a full crop, a good dressing of cow manure and an application of wood ashes will give good returns, as the maturing of so large a number of seeds is necessarily an exhaustive process for both tree and soil.

Varieties. In the coldest sections of Ontario it would be inadvisable to attempt the growing of many plums of the European and Japanese types. A few trees might be tried. *Glass Seedling*, a large blue plum of only medium quality; the *English Damson*, *Yellow Egg*, *Lombard* and *Reine Claude* will be found amongst the hardiest, notably the two first. Among the native plums, *Wolf*, *De Soto*, *Hawkeye* and *Rollingston* may be recommended. These are very hardy, comparatively free from disease, and, though small, are excellent for canning purposes. In the milder sections the following list of the European class are suggested for commercial purposes, in order of ripening: *Bradshaw*, large blue; *Imperial Gage*, greenish-yellow; *Washington*, large greenish-yellow; *Smith's Orleans*, blue; *Lombard*; *Yellow Egg*; *German* or *Italian Prune*, blue; *Reine Claude*, green; *Coe's Golden Drop* and *English Damson*.

For the planter's own use, *Huling's Superb* and *McLaughlin* may be added, both plums of the gage kind, and of the highest quality. Other excellent sorts are *Prince of Wales*, *Dunn's Purple* and *Goliath*. *Lombard*, the most commonly grown plum, is probably over-planted. It is a vigorous grower, productive and fairly hardy. On the other hand, it comes in at a bad time—mid-season—is very subject to rot and black-knot, and is of poor quality. It needs good care

FIG. 47
M. BURRELL

FIG. 48

and thinning to do really well. The Japanese types are proving as hardy as many of the European class, but many of them are of inferior quality. *Abundance* (see Fig. 46a), *Red June* and *Burbank*, are the ones recommended here. The *Abundance* is an upright grower with slender branches, a good and early bearer but rather subject, as is *Burbank*, to rot. Fig. 47

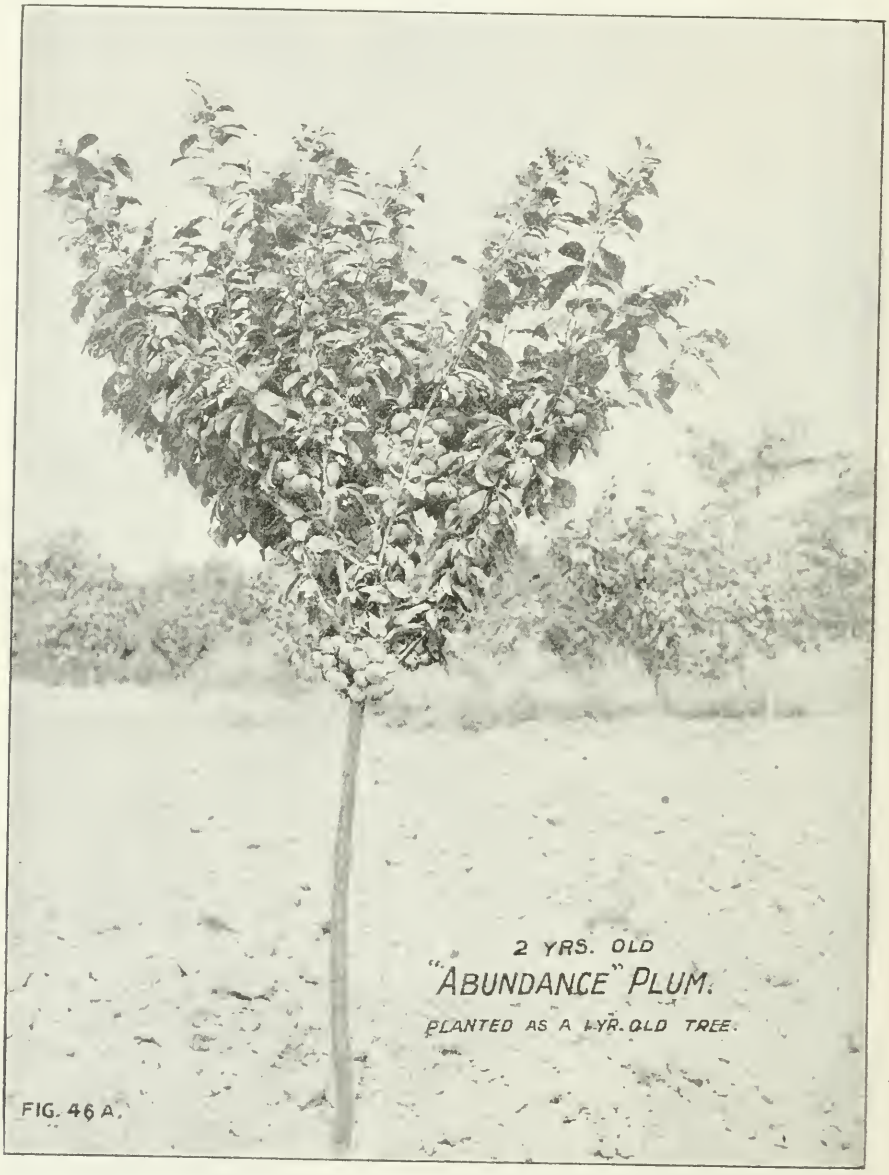


FIG. 46 A.

shows the characteristic growth. This variety should be shortened in to outside buds to encourage a spreading habit. *Burbank*, Fig 48, runs to the opposite extreme, throwing out strong, wide-spreading limbs, and must be pruned accordingly.

Diseases. Monilia, or rot, is by far the worst thing to contend with in plum culture. It has been referred to under the peach. Thinning will tend to lessen it, as will systematic

spraying with Bordeaux mixture. When the plums are ripening, all specimens showing rot should be gathered separately and destroyed. None should be left on the tree, as the shrivelled plums that pass the winter on the tree will undoubtedly carry the spores of the fungus to the next year's crop.

Black-knot is also a fungus, maturing its spores twice a year, in May or June, and again in February or March. Constant cutting out and burning of all knots will control this disease in any orchard, but it becomes a difficult matter to subdue this disease unless the whole neighborhood co-operates in the task with something like thoroughness.

Curculio and plant lice are the insects most troublesome to the plum. Both are dealt with in the publications referred to previously. It may be added that the 4 ozs. of Paris green to the barrel will by no means kill all the curculio, and in a season when this insect is plentiful an undesirable number of plums will still be destroyed. Five and even six ounces can be used to forty gallons as long as plenty of lime is used to neutralize the caustic effect of the arsenic.

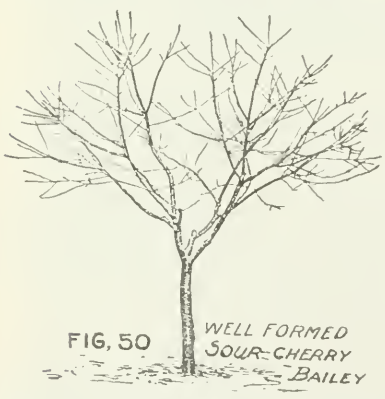
The Cherry.

This fruit has been receiving deserved attention in southern Ontario during the last few years, although its full value as an orchard crop has by no means been fully recognized. Broadly speaking, there are three types,—the sweet cherries, including Bigarreau and Heart varieties; the sour, including Morellos and the Kentish varieties; and the Duke class, the varieties of which come half-way between the sour and sweet types, having a growth corresponding more to that of the sweet cherry, but fruit of an acid or sub-acid character. In southern Ontario, and where the tender varieties of the Domestica plums succeed, the sweet cherry and the Dukes will be satisfactorily cultivated. Outside the peach limit, however, it would be advisable to have a northern exposure. Most varieties of the Morello type will thrive with proper care over the larger part of Ontario.

Soil While many of the fruits already treated of will succeed in a variety of soils, providing proper drainage is given, the cherry is particular about its location. A warm, sandy or gravelly soil, rich and well drained, is the ideal spot. If planted on heavy or wet lands it may

do fairly well with extra care for a short time; but real success cannot be achieved and the tree will not live many years.

Planting and Pruning. The sour cherries may be planted about eighteen feet apart, the Dukes twenty, and sweet cherries at least twenty-five. Even a sour variety, like the Early Richmond, would probably be better twenty feet apart. Fig. 49 is from a photograph of an Early Richmond orchard ten years old, and sixteen feet apart, and it will be seen that the trees even now need room. The cherry, of all fruit trees, is the most difficult to transplant successfully. The general experience is that more losses occur than with the planting of any other kind of tree, and it will decidedly pay to buy one-year-old trees. The method of pruning the first two years is much like that employed for the apple. The Duke cherries are very upright growers, and the young shoots should be pruned to an outside bud, and the head somewhat opened up. The sour cherries, on the other hand, are inclined to be drooping and spreading in habit, and the tendency must be corrected as early as possible. See Fig. 50. The head once formed, little pruning of the cherry is required. In fact, the less the better, as a good deal of gum exudes from the pruned parts, and the wounds heal less easily than those of other trees. The sweet cherries may be headed slightly higher than the Dukes or sours. Fig. 51 illustrates a crotch the evil of which will be remedied by removing the branch at A in Fig. 52.



Cultivation and Manuring. The general system of tillage and manuring advocated for other fruits will apply also in the case of the cherry. People who have been accustomed to grow the sour cherry in sod along their fences have little conception what this fruit will do when generously treated. The orchard in Fig. 49, comprising now about one hundred and forty bearing trees, commenced to fruit in the fourth year, and has not failed to produce a crop since. Since that time it has received one heavy coating of manure, a good crop of crimson clover plowed under, and two applications of unleached wood ashes at the rate of eighty bushels to the acre. No weeds have been allowed to grow. No plowing was done in the past spring, the disc harrow working the ground from the trees and a fine-toothed harrow doing the rest of

the work, with the exception of a little hoeing round the trees. Three hundred and forty baskets of fine fruit were taken off the last season, and practically no rot or wormy cherries in the whole orchard. The only poor row was the one next to the fence, where cultivation could only be given on one side of the row.

FIG 52 The tree pruned.

FIG 51 Windsor cherry, four years set.

Varieties, in Order of Ripening. For the colder sections of the Province, *Early Richmond*, *Montmorency*, *Ostheim*, *English Morello*. All of these are sour and of high value for preserving and cooking purposes. *Montmorency* is a firm cherry, of good size, and of a more upright growth than the *Richmond*. (See Fig. 53.)

For districts where the thermometer seldom goes lower than 15° below zero, the above varieties for sour; and, in addition, *May Duke*, *Black Tartarian* and *Windsor*. Extensive planting of the sweet varieties is not recommended till more is known about their hardiness. Professor Hutt, of the Ontario Agricultural College, is now testing a large number of these varieties. For southern Ontario, *Early Richmond*, *Montmorency*, *English Morello*, *May Duke*; Sweet varieties—*Governor Wood*, *Black Tartarian*, *Yellow Spanish*, *Knight's Early Black*, *Napoleon Bigarreau* and *Windsor*.

Diseases. Mildew, black-knot and rot (Monilia). Mildew of the leaf (especially affecting the younger trees of the sour class). For this, spray with Bordeaux mixture. Black-knot, affecting sour cherries chiefly, systematic cutting out and burning. Rot, principally affecting the sweet cherries; this is the great drawback to the culture of the sweet cherry. One spraying with Bordeaux mixture before the blossoms open, and two or three after they have fallen, will generally keep the crop fairly free from rot. In a wet season it is impossible to prevent it altogether. *May Duke*, *Yellow Spanish* and *Napoleon Bigarreau* are especially liable to rot.

Insects. Curculio, black aphis, and sometimes the peach borer. The best remedy for the black aphis is tobacco water, one pound to three gallons, and one quarter pound of whale oil soap added, or one pound whale oil soap to seven gallons water, mixed hot. Kerosene emulsion, if used, should be strong—one to seven or eight. The applications must be early and thorough.

The Quince.

The history of the quince carries us back as far as the early days of Greece. An ancient, and always a highly-esteemed fruit. Judging from the prices of the last few years, the quince appears to have fallen from its high estate. The Greeks and Romans considered it to be possessed of special health-giving properties. The modern quince grower would doubtless like to pursuade the public of the truth of this, and would gladly see a little of the money that is spent on patent medicines devoted to the purchase of quinces. At all events, there will always be a fair demand for good samples of this fruit, and every farmer should have a tree or two for his own use. For jellies, and for preserving with other fruits, it has a high value, and can be easily and cheaply grown.

FIG. 54

Neglected Quince-Tree.

FIG 55 THOMAS

Well-Pruned Quince-Tree

Soil. The quince can stand more neglect than most fruits, and usually gets all it can stand. It is a popular belief that a low, wet corner, unfitted for anything else, will make an appropriate home for a quince tree. Nothing could be farther from the mark. It should have a rich, deep, mellow soil, and well drained at that.

Planting, etc. Two-year old trees should be planted, and at a distance of twelve feet apart. The tree should be shaped with a very low head, the pruning being merely the thinning out of the centre, the removal of all suckers and an occasional cutting back to keep the tree from getting a straggly appearance. Some people grow them in bush form. If this is done,

only three or four main stems should be allowed to grow. The accompanying Figs. 54 and 55 will illustrate the matter. Where old trees have been neglected, they should be thoroughly pruned on the lines indicated, and have a good dressing of manure worked in around the roots in spring. When the trees are in full bearing, cultivation becomes difficult on account of the closeness of the trees and their spreading character. The quince orchard may then be seeded down, but pruning must not be neglected, and a top-dressing of manure should be given every second or third year.

Varieties. *Champion*, *Meeche's Prolific* and *Orange* are all good quinces of the large, round, orange type. The *Pear* quince, as its name indicates, is pear-shaped. It is a more solid fruit than the others, ripens later, and is somewhat smaller. If well manured and thinned it will give excellent results.

FIG 56 New York quince trees.

Diseases. Blight and "red rust" are the worst diseases affecting the quince. The latter is the same fungus that in the earlier stages is known as the "cedar-apple" of the red cedar. Spraying with Bordeaux mixture will assist in controlling it, but where practicable it would be advisable to cut down cedars near the quince orchard.

Insects. The borer and the quince curculio are sometimes injurious. The former is the round headed apple borer (*Saperda Candida*) and is referred to in the 1897 Institute Report p. 180. The curculio can be trapped by the "jarring" method.

The Grape.

Notwithstanding the fact that there are some four millions of grape vines in Ontario, many farmers even yet do not grow a single pound of this fine fruit, especially in the northern and eastern parts of the Province, where the difficulties of grape culture are supposed to be greater than they really are. The professional vineyardist of Southern Ontario who counts his vines by the thousand has possibly not a great deal to learn. The difficulty now is not so much the production of the fruit as the finding of a good market. But scattered through all parts of the country are people who own small vineyards which are by no means producing a high quality of fruit, and still others who, buying few or no grapes, yet have no vineyard of their own. It is to these classes more than to the commercial grower that the following remarks on grape culture are directed.

Soil and Exposure. The best site for the vineyard is a gentle slope facing to the south or southeast. In the low levels there is more danger from frosts, and on a northern exposure there will be some difficulty in ripening the later varieties. The grape loves a rich, warm and dry soil. The preparation of the land should include underdraining if the subsoil is at all wet or non-porous. It will thrive on sandy or gravelly soils, but on the very light soils there is a greater tendency to disease, especially to mildew. A rich, well-drained clay loam is the most satisfactory. The general opinion is that the quality of the fruit is higher on the heavier ground, though Fuller asserts the contrary.

Planting and Cultivation.

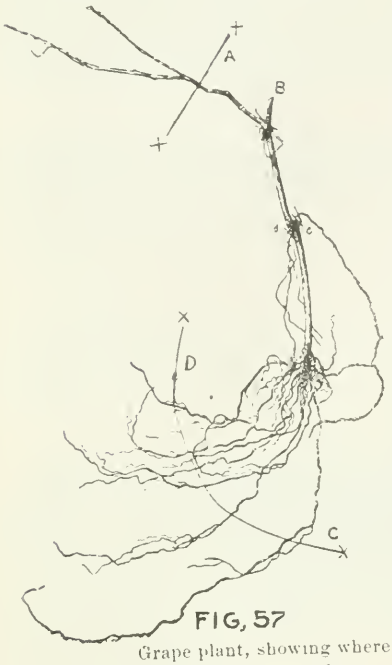


FIG. 57

Grape plant, showing where it should be pruned.

Vines of the strong-growing varieties, like Niagara and Rogers, may be planted as one-year olds. As a general rule strong two-year old vines are the best to plant. Varieties like Delaware, Catawba and Moore's Early may be planted eight feet apart, but as most vineyards contain many of the strong-growing kinds which require more room, a good distance would be either ten or eleven feet each way. This would allow convenient cross cultivation before the trellis is put up, and give ample room for harrow, wagons, etc., between the rows later on. The vine should be planted fairly deep and the earth well packed round the roots. If the roots are coarse and long cut back to about eighteen inches. Prune the top down to two or three buds. Fig. 57, from Bailey's "Pruning Book," illustrates the pruning of one type of two-year old vine. The top should be cut at A and B, the upper roots trimmed off at C and D, and the main roots cut in from E to F. Hoed crops can be grown the first three years between the young vines and thorough cultivation given. By the late fall the young vine should have made a growth of three or four feet, and should then or in the spring be pruned to a single cane and that cane should be cut back to two or three buds. The trellis may be put up the second spring or left till the third. The young vine having got thoroughly established during the first summer will, under good conditions, make a vigorous growth the second year, not more than two canes being allowed to grow. We have now come to the end of the second season, the treatment up to this time being practically the same whatever style of trimming may be adopted.

The Trellis. Various kinds of trellises have been in vogue at different times, but we need only here consider the post and wire method. Cedar or chestnut posts should be used. These can be eight feet long, sharpened at one end and driven down with a heavy maul eighteen inches or two feet. This is the practice in the famous Chatauqua grape district. Or the posts may be nine feet long and a post augur used for the holes, which should be three feet deep. Two, three or four wires are used, according to the system of training. No. 12 wire is a suitable size, except in the two-wire trellis, when No. 10 wire should be used for the upper wire and No. 12 for the lower. Figs. 58, 59 and 60 show different ways of bracing the end post,

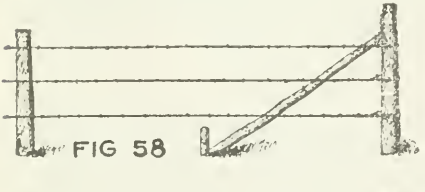


FIG 58

FIG 59

Bracing the end post. BAILEY

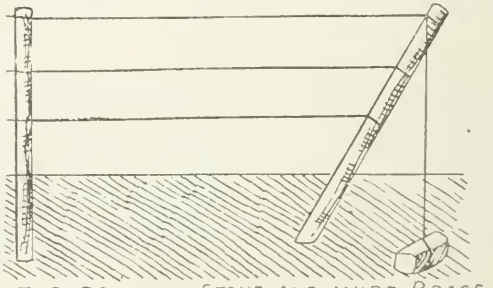


FIG 60

STONE AND WIRE BRACE AFTER BAILEY

upon which the heavy strain comes. Of these Fig. 59 is decidedly the best. Either of the others will, however, be satisfactory where the rows are not too long. The posts should be set about twenty-five or thirty feet apart, two or three vines between the posts.

Training. Four systems of training are practised among vineyardists, each of which has its warm advocates.

1. The horizontal arm and spur system.
2. The Kniffen system.
3. The high renewal.
4. The fan.

No hard and fast rules, however, can be laid down in this matter. Every man has his own fancies, and various modifications of the many systems may be seen in all vineyards. "All intelligent pruning of the grape," says Bailey, "rests upon the fact that the fruit is borne in a few clusters near the base of the growing shoots of the season, and which spring from wood of last year's growth. A growing leafy branch of the grape vine is called a *shoot*: a ripened shoot is called a *cane*: a branch or trunk two or more years old is called an *arm*.

The horizontal arm and spur method—called the *Fuller* system—is well suited for cold sections, where vines have to be laid down for the winter, and may be first dealt with. Fig. 61 represents the young vine at the end of the second season. The two canes are cut back at *a*, *a*, and bent down and covered for the winter, Fig. 62. In the spring the two arms are tied along the lower wire. A shoot will spring from each bud on the canes, and at the end of the third season the vine will be as at Fig. 63. The vine is now pruned, the canes being cut back to a spur of two buds. As two bearing shoots will spring from each spur in the fourth season the arms may be slightly shortened so as to leave not more than five spurs on each arm. In the early summer

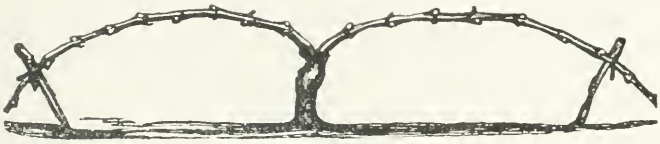


FIG. 62.

any superfluous shoots that may have forced out from the trunk or arms, and all laterals or side shoots, which usually spring from the base of the regular shoot, should be removed, and the ends of the main shoots should be pinched when the top wire is reached. At the end of the fourth summer there will be twenty canes, two from each spur. Every alternate cane will be cut off as close to the arm as possible, and the other cut back to a spur of two buds—see Fig. 64. So that, as before, twenty bearing shoots will be provided for.

This, briefly, is a sketch of the horizontal arm and spur system. It necessitates more tying than other methods of training, but has many excellent features.

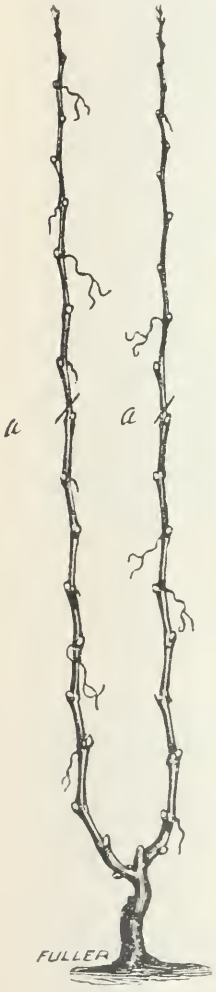


FIG 61

FIG 63 (FULLER)

FIG. 64

The High Renewal System. In this system three wires are used, the lowest about eighteen inches or two feet from the ground and about the same distance between the wires. In the second season a single shoot or two shoots forming a Y trunk are tied to the wire, and in the third spring are tied along the wire, somewhat as in the Fuller system. At the end of the third season the vine presents the appearance of Fig. 65. Instead of leaving two permanent arms and

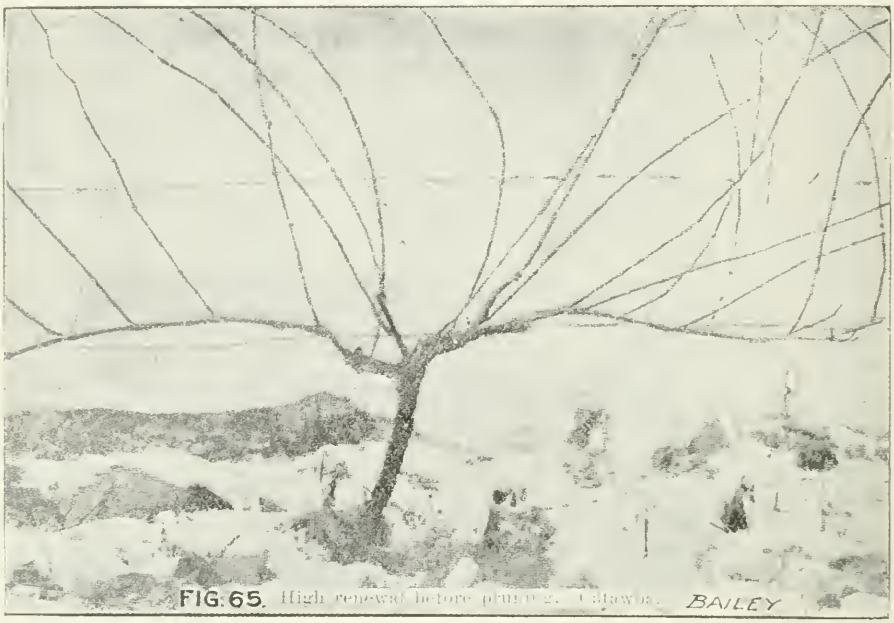


FIG. 65. High renewal before pruning. Catawba.

cutting back to spurs, as in the Fuller method, the old arms are cut away and two vigorous canes bent down. Two stubs, or long spurs, are also left, from which canes will be selected to form arms another year—see Fig. 66. There is thus, in this system, a constant renewal of all wood except the main stem or trunk. The number of buds (from which the fruit-bearing shoots come) left on a vine after pruning would be from 25 to 30.

FIG. 66 High renewal, pruned and tied.

The Kniffin System. This is perhaps the most popular method of training the vine amongst commercial growers, and is a system which, with various modifications, will probably be generally adopted in all large vineyards. The advantages that it possesses are three—it permits a cheaper trellis, there being only two wires employed ; it necessitates no summer tieing, the shoots being allowed to hang free ; and it affords greater facilities for cultivating the ground beneath the vine. All these things make for cheap production and, with present prices for grapes, cheapness of production has to be very earnestly considered. In the true Kniffin system two wires are used, the lower about three and a half feet from the ground, and the upper about five and a half feet. In the third spring a single strong cane is tied to the top wire and also to the lower. This cane will form the permanent trunk. At the end of the third season there will be eight or nine good canes on the main stem. Two of the upper ones are selected and cut back to about eight buds each and tied to the wire. Two others, with five or six buds each, are tied along the lower wire, as in Fig. 69. At the end of the fourth season the vine will present the appearance in Fig. 70. The same process will then be repeated. Four strong canes will be selected and tied for the fifth season, as in Fig. 69. After a time the cutting back operation will leave a stubby, awkward lot of old wood where the horizontal canes start. It will then be wise to take, at the first opportunity, a shoot direct from the main stem and train it as an arm, cutting away all old wood that has gradually collected between the trunk and the horizontal canes. It will be noticed also that the Kniffin system simplifies pruning very much. There is no desire to urge here that the Kniffin system will give better results than many other methods in operation. In many vineyards a combination of Kniffin and the Fan system is giving good results, but, properly managed, the Kniffin-trained vineyard will yield as well as any, and nobody can question its greater cheapness and the conveniences it presents. Success can be achieved with all systems, and in this matter of grape-training, there is lots of room for the expression of a man's individuality. The main things are—see that the vine is in a good thrifty condition ; do not allow an unnecessary accumulation of old wood ; and let pruning be directed so that enough healthy last year's wood shall be left to produce the right number of bearing shoots this year. For one man who prunes too closely there are ten who leave too much wood. From twenty-five to forty healthy buds are ample.

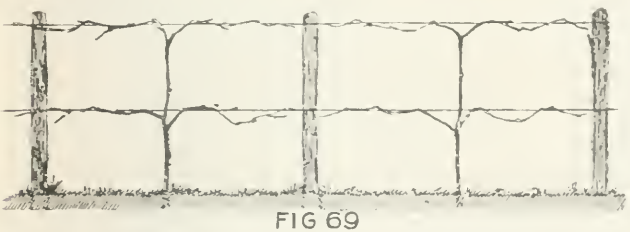


FIG 69

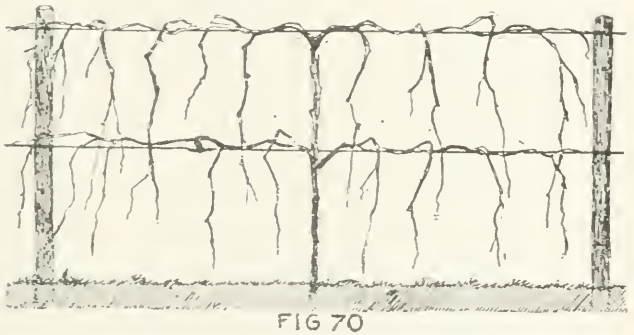
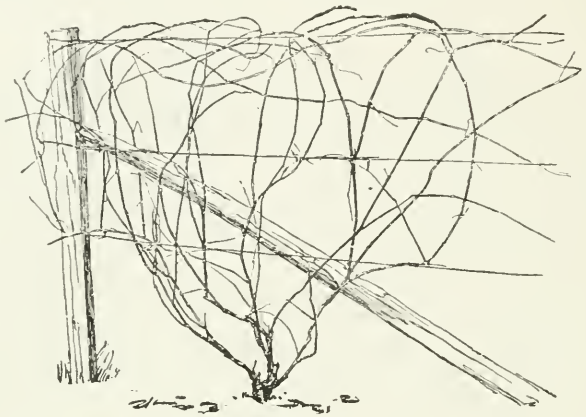


FIG 70

Summer pruning need not be done except in the Fuller system, where some pinching in of the shoots is practised. With most systems, however, the vigorous growers, like *Brighton* and *Rogers*, will produce such immense shoots that cultivation is impeded. When they begin to get straggly and a nuisance, the ends can be trimmed off very quickly with a sharp sickle or corn knife. Importance should be attached to the early removal of superfluous shoots, and laterals or axillary branches. This operation does not take so very long, and is a true "thinning" process. These secondary shoots often bear one or two bunches, and second class bunches at that. The vine will have enough fruit without them. The remaining fruit will be finer, and there will be a better lot of ripened canes to select from the next year. As to the time of pruning. Any time through the winter where the vines can remain uncovered. It is better to finish all pruning before the sap starts, though it is questionable if the bleeding of the vine does much harm, and it is hardly necessary to say that it is a vast deal better to prune late than not at all.

The Fan System. In this system, which is not much in vogue in recent days, the wood is renewed almost from the ground every year. An excessive amount of old wood and a trunk are thus dispensed with, and after fall pruning the vine is easily covered, where winter protection

is needed. Fig. 67 from Bailey's "Pruning Book" shows a vine trained in this way. With so much growing wood close to the ground there will be more difficulty in keeping the fruit clean than where a higher system is adopted, and the tieing is somewhat inconvenient.



Fan-trained Concord. FIG. 67

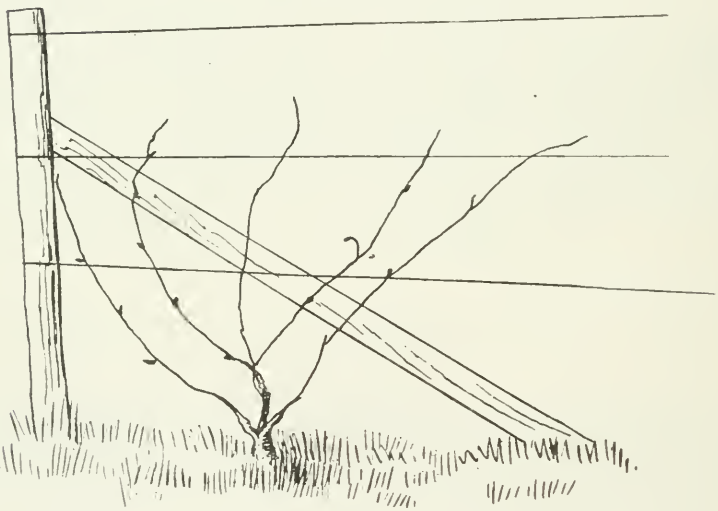


FIG. 68. THE VINE PRUNED

Manuring. The fertilising treatment accorded to the grape should be on as liberal a scale as that given to other fruits. Where a big growth of wood is being made it is a sign that enough nitrogen is present in the soil. Additional barnyard manure is not necessary, and will in fact tend to promote an overgrowth and to induce mildew. A heavy dressing of ashes, or muriate of potash will then give excellent results, the grape being one of the heaviest consumers of potash of all fruits.

Varieties. A good list for the commercial grower is the following;

Black.—*Worden, Roger 4, Roger 44, Concord.*
Red.—*Wyoming Red, Roger 9 (Lindley), Delaware, Roger 15 (Agawam), Vergennes.*
White.—*Niagara, Moore's Diamond.*

Many varieties of grapes have imperfect blossoms, and where this occurs, other varieties of a self-fertile character should be planted near. *Rogers 4, Salem, Brighton,* and *Rogers 9 (Lindley),* will be unsatisfactory when planted alone. *Niagara* and *Delaware* have an abundance of pollen, and *Concord, Roger 15, Vergennes* and *Worden* will fruit satisfactorily alone.

List of varieties for home use:

Black.—*Moore's Early, Worden, Rogers 4 and 44.*
Red.—*Brighton, Lindley, Delaware, Salem.*
White.—*Niagara, Moore's Diamond.*

With respect to this list, it may be added that *Vergennes* is a good bearer, fair quality and excellent keeper, but it ripens too late for many sections. *Moore's Early*, although a good early black grape for the amateur, is not vigorous or productive enough for the commercial grower. *Wyoming Red* is early and prolific, but poor quality.

Diseases.—Black Rot, Brown Rot, or Downy Mildew, Powdery Mildew, Yellow Leaf, Anthracnose, called Bird's-eye rot when attacking the fruit. It would take too long in a brief practical treatise, such as this, to describe different diseases. Readers are referred for full information to Bulletin 92 of the Ontario Agricultural College and to "Fungous Diseases of the Grape and other Plants" by Professor Lamson-Scribner. Yellow Leaf is a disease of comparatively recent origin and little is known of its nature. The bright yellow color of the foliage, the shrivelling of the berries and the dying condition of the vine readily indicate the trouble. It is advisable to up-root diseased vines and reset with healthy plants. Bordeaux mixture is the standard remedy for the rot and mildews. For the common form—the Powdery Mildew—ordinary flowers of sulphur will be as good or a better remedy than Bordeaux mixture. It can be dusted through and under the vines directly the leaves expand, and a second time when the grapes begin to form. The varieties chiefly subject to mildew are *Brighton*, *Rogers 44*, *Rogers 9*, *Salem* and *Agawam*, but if the sulphuring is done early and thoroughly there will be no difficulty in growing a clean fine sample of these choice grapes.

The Strawberry.

The earliest and possibly the most wholesome of all fruit, who would not grow strawberries? And yet many a farm home is without a supply of this fine fruit; and many others, owing to a lack of knowledge or a want of thought on the farmer's part, get samples that are but caricatures of this noble berry at its best. Like the other small fruits the strawberry imperatively demands a rich, well-drained and moist soil. Unlike the raspberry, it is a comparatively shallow feeder, and this fact must guide us to some extent in manuring and in tillage. Thorough preparation of the soil before planting will especially pay in the case of the strawberry. The ground should be thoroughly worked, and if underdrained or if subsoiled so much the better, as such soil will be drier in a wet season and moister in a dry season. As no fruit is looked for the first year, but only a good strong lot of plants, well-rotted barnyard manure is the most profitable as it is the most convenient of fertilizers. In the second year, when fruit is the object, the case is different. The berries take practically no nirtogen out of the soil, and as this element is the important one in barnyard manure it is obvious that such manure could be better employed elsewhere. We have an ideal fertilizer for the berries in unleached wood ashes, which contain in well-balanced proportions the two elements required by the fruit—potash and phosphoric acid. This may be applied broadcast over the patch in the late fall or on light soils very early in the spring. Anywhere from 50 to 100 bushels to the acre may be profitably used, and, for preference, the larger amount. Spring planting is usually found best. Put out young vigorous plants as early as possible so that they may get thoroughly established before dry weather comes. From three to four feet between the rows and eighteen inches in the row will be a suitable distance. In a large patch the rows may be marked with the corn marker and the holes made by striking a spade in the ground and moving it backwards and forwards. A boy can follow and spread the roots of the plant fan-shaped in the cleft. Whatever method of planting is followed the important things are that the earth should be well firmed round the roots and the plant set the right depth.

FIG. 71

FIG. 72

FIG. 73

FIG. 74

The above illustrations from Bulletin 27, Central Experimental Farm, show clearly how to do and how not to do it.

Fig. 71 is obviously all right. In Fig. 72 the root system has a poor chance to develop quickly. Fig. 73 shows a plant too deeply set. In such a case the crown would be smothered and the plant die. In Fig. 74 the reverse has happened and the plant would probably soon wither and die.

Strawberries may be practically divided into two classes, those with perfect and those with imperfect blossoms. The former has both stamens—male organs—and pistil—female organ. The latter only the pistil.

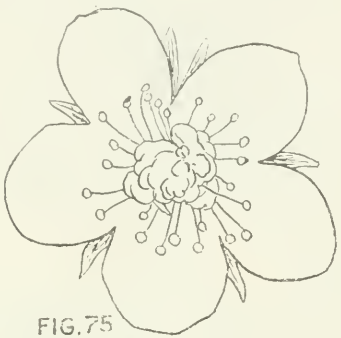


FIG. 75
Perfect Flower

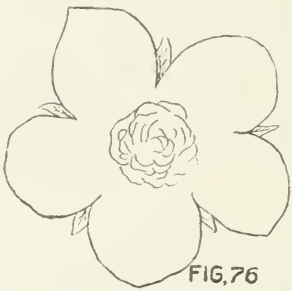


FIG. 76
Imperfect Flower

In Fig. 75 and 76 illustrations of each kind will be seen. As a pistillate variety cannot produce fruit unless fertilized by the pollen from a perfect flower, it is necessary to see that at least part of the patch is given up to varieties with a perfect flower. One row of "perfect" varieties to every three rows of varieties with imperfect blossoms will answer the purpose. Cut off all blossoms from the newly set plants. They will produce fruit at the expense of growth. Cultivate and hoe thoroughly and often. If possible do not let a single weed go to seed the first season and you will be well repaid the following year. On the whole the "matted row" system of growing is the best. Some growers cut off all runners for the first two months and then let them grow; others—and this is probably the better plan—allow a few runners to establish themselves from each plant and then cut off all subsequent runners. In this way a sufficent amount of strong vigorous plants are ready for fruiting next year. In any case the mistake should not be made of getting a wide, densely matted row, where half the plant are producing little or no fruit, or fruit of an inferior quality. The continual freezing and thawing that often takes place in the latter part of the winter is seriously injurious to the plants and a winter covering is therefore generally advisable. The mulch should be put on when the ground first freezes up and raked into the space between the rows directly spring growth commences, where it will conserve moisture and keep the berries clean. In a small way pine boughs and a layer of leaves answer admirably. On a large patch marsh hay or clean wheat straw will do. A manure mulch produces too many weeds, and any mulch that packs very closely will do more harm than good. The labor involved in keeping a patch in good shape for a second year's fruiting has made the practice of resetting every year very general. Certain varieties do so much better in one locality than another that no positive statements as to the values of varieties can be made. Let every man ascertain what kind does best under his local conditions.

FIG. 78
Bubach.

The following list of well tried varieties is suggested:

Haverland. Pistillate, large, productive, rather soft.

Bubach. do very large, firm, not a good "runner."

Warfield. do medium size, very productive.

Williams. Perfect blossom, large and firm, and good yielder, though tendency to show a green tip.

Van Deman. Perfect blossom, early.

Dominion. do late.

Clyde. do a new and very promising variety; large, vigorous and productive.

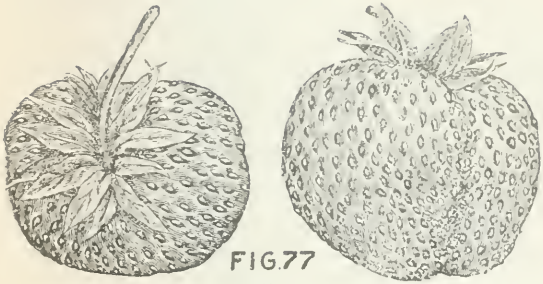


FIG. 77
Williams.

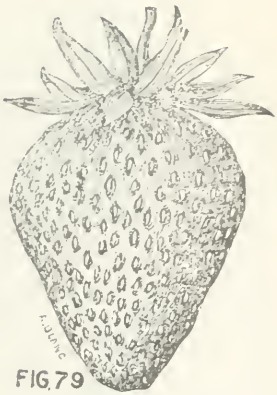


FIG. 79
Warfield.

FIG. 80

FIG. 81 HAVERLAND.

Diseases.—The chief disease attacking the strawberry is the Rust fungus. Fig. 82. Where foliage is much injured by this disease it naturally affects the production of new plants and the subsequent crop of fruit. One spraying with the Bordeaux mixture before fruiting, and two later on, if the patch is kept over, will do much to control the rust.

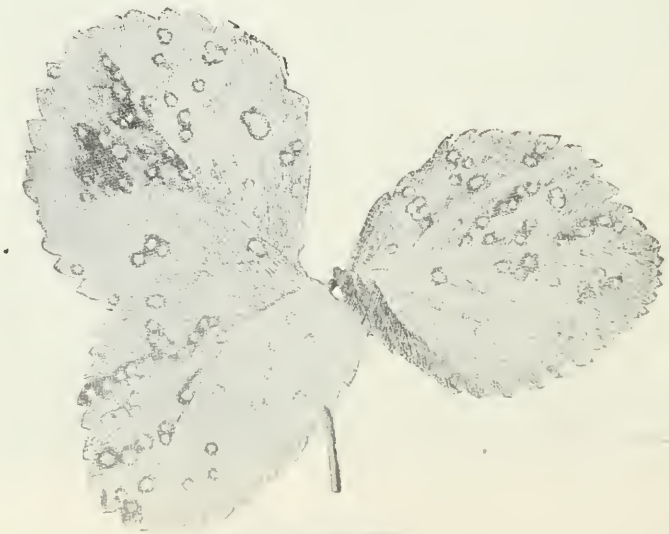


FIG. 82. Leaf Rust.

The Currant.

The fact that the currant is not only one of the most healthful of fruits, but also one of the hardiest and most productive, should ensure it a prominent place in every farmer's garden. Unfortunately this very fact causes it to be too often badly neglected. The average currant bush grows at its own sweet will, and the owner has little conception what an immense difference in the size and quality of the fruit would be made by thorough cultivation. The currant will thrive well in any well drained soil, coolness and moisture being necessary for the production of the best fruit. If the soil is too light and hot, the fruit will usually shrivel before maturing, and in such soil a mulch of some sort for two or three feet around the bushes is advisable. Good, strong one-year old plants will be as good as older ones, and cost less. Anyone, however, can grow his own plants by taking cuttings in the fall from the well-ripened wood of the past season's growth. Make the cuttings from six to ten inches long, plant in September in a row, rubbing off the lower buds when planted, and cover when freezing weather approaches with straw or coarse manure, or the cuttings may be tied in a bunch and buried with about two inches of soil over them, and covered for the winter by coarse manure and then planted early in spring. By next fall they should make good, strong roots. (Fig. 83 and Fig. 84 here.) As the currant is a rank feeder, a liberal application of manures should be given; in fact no fruit will respond so quickly to generous treatment in this respect. Thorough and systematic pruning is necessary with the currant as with the gooseberry. This may be done very early in spring before the buds unfold. The fruit is borne on the previous year's shoots as well as on the older growths, but as a rule the younger the wood the finer the fruit. The superfluous young shoots should be cut out, and also all wood over three years old. There must be a constant renewal of strong, healthy wood, if good fruit is to be grown. The old practice of growing in tree form is now discarded. Four or five main stems are best, and renew these from time to time by judicious pruning. If the young wood has made such rank growth as to make the bush straggly the ones that are left may be shortened back to advantage. Bushes treated in the way suggested will last for a great many years, but it is well to replant when over ten years old Where it is desirable to rejuvenate old bushes, they may be cut off close to the ground, and, with well-rotted manure forked in around them, a vigorous top will soon be formed. The cultivation of the currant should be constant and shallow, as the roots run near the surface. From five to six feet apart is as close as the bushes should be planted. The insects chiefly troublesome to the currant are the familiarcurrant-worm which is the larva of a saw-fly; the currant louse and the currant borer. The currant worm is controlled with great ease if the work is done directly the worms hatch. For these and the currant louse see F. Institute Report '96-'97, pages 175 and 192. The borer is the larva of a wasp-like moth, the eggs are laid on the stem from late in May till June. The borer cuts the pith up and down in the stem, and emerges as a moth again that May. Cut out and burn all infested stems in the early spring.

FIG 83

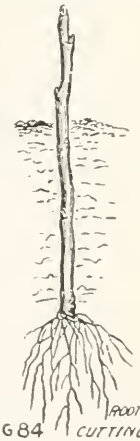


FIG 84

Varieties. Of the red varieties the *Cherry* and *Fay's Prolific* are probably the two best, in white the *White Grape*, and of the black, the old *Black Naples*.

The Gooseberry.

The gooseberry is essentially a northern plant, and makes much the same demands on the soil as the currant does. It will be found most successful in a rich and strong clay loam, and will thrive, like the currant, in partial shade, providing that it gets the necessary manure. Well-rotted cow manure is probably the best fertiliser for the gooseberry, supplemented with a dressing of hardwood ashes or muriate of potash when fruiting time arrives. Generous treatment in this respect must be given to get fine fruit, as, like its relative, the currant, the gooseberry is a gross feeder. Propagation by cuttings is less successful than with the currant, but those who wish to grow their own plants can easily do so by the simple process of "layering." If a large number of plants are required the old bushes should be cut back almost to the ground in the autumn. About July 1st, when the bush has thrown up a large top of vigorous young shoots, earth is mounded up round the bush, leaving only a few inches of the tips exposed. In

the fall the majority of the new shoots will have rooted and may be removed and planted. If only a few plants are required a few of the lower shoots may be bent down about July 1st and covered with earth except the tips. Or the suckers which spring up round the bush may be transplanted. Thorough pruning is emphatically essential to success in gooseberry culture. Fruit is produced from all parts of the bush except very old wood and the new growths. But with a vigorous growing bush from a third to one-half the wood should be annually cut away. The best fruit is borne on one year old wood, and the aim should be to continually remove the older wood, and have a sufficient number of these strong healthy one year old shoots. It may be said of the gooseberry, as it may be of the grape vine, that the special method of pruning is of less importance than the fact that pruning must be regular and vigorous. Whether the bush system or tree system is followed, training to spurs or to long shoots, the important thing is that there should always be left a good supply of bearing wood, but not a tangled-up affair with a network of wood that can only produce a small and inferior class of fruit. The distance of planting should be the same as that of currants, and the cultivation thorough and shallow. Mulching will undoubtedly pay in hot seasons. Unless the owner is prepared to give great care to his plants he had better confine himself to the American varieties, as the larger European kinds are particularly subject to mildew.

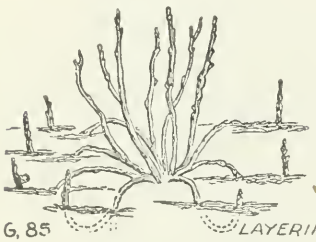


FIG. 85 LAYERING

White Smith. FIG. 86

Varieties. *Downing*, a vigorous and productive variety, bears fruit of a whitish-green color, smooth skin and good quality. *Pearl* is very similar. *Houghton*, a slender grower with red fruit, somewhat smaller than the other varieties named. Of the European gooseberries, *Industry*, a large dark red, and *White Smith* a large yellowish-green, are recommended. A large number of remedies have been suggested for mildew of the gooseberry, but by far the best is the application of potassium sulphide (liver of sulphur), at the rate of one ounce to two gallons of water. This should be applied directly the buds swell, and at least twice more at intervals of a week or ten days. The currant-worm, which attacks the gooseberry with equal readiness, is referred to in the chapter dealing with currants.

Red Raspberries and Black Caps.

These valuable fruits are so common throughout Ontario that little need be said as to their great value. In the canned state for winter use there is no fruit which retains so delightfully the freshness and aroma of the ripe fruit as the red raspberry. It is a veritable whiff of summer which follows the opening of a jar of "*Cuthberts*" in mid-winter. There are three types of the red raspberry now in general cultivation, those from the European wild raspberry, such as *Antwerp* and *Franconia*, those developed from the American wild raspberry, such as *Cuthbert*, and the hybrids, such as *Shaffer*. The European varieties are less hardy and more likely to suffer from the hot sun in this country. Many of the hybrids are marvellously productive and vigorous, but the fruit is usually soft and the color unattractive. The raspberry is a biennial as far as the cane is concerned, fruit being produced on the cane which was grown the previous year. In other respects the plant is a perennial, and with good care a plantation will last profitably ten or twelve years. A deep rich and moist sand is the most suitable soil for the red raspberry. The black-cap will thrive equally well on a fairly heavy clay loam, but in any case the soil must be well underdrained and the reverse of compact, for, of all fruits, the raspberry is the first to suffer from an excess of moisture and from drought at the ripening period. Vigorous shoots of the previous year's growth are the best plants to set, and in all cases they should be cut back to six or eight inches high after planting. In June the young shoots may

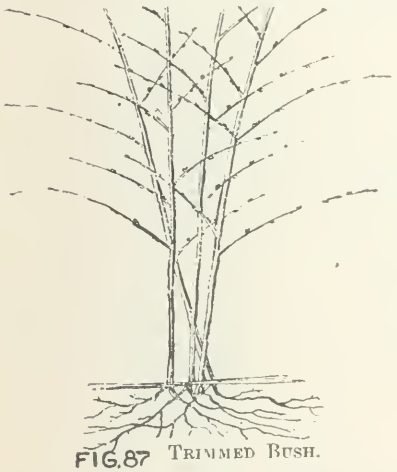


FIG. 87 Trimmed Bush.

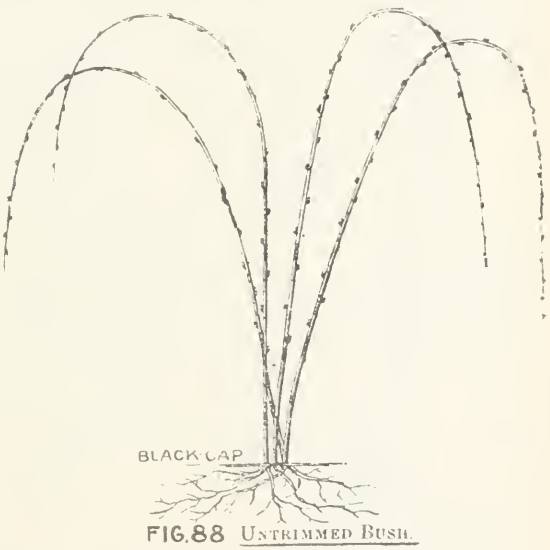


FIG. 88 Untrimmed Bush.

be transplanted, if the work is done carefully in damp weather, but the older plants are preferable. If cultivation in rows is desired the plants should be set three feet apart and the rows six feet apart. The red raspberry, however, throws up such a large number of suckers, most of which have to be cut away, that a good practice is to plant five feet apart and cultivate both ways. In this way, not only are the superfluous canes kept down more easily, but a finer quality of fruit, and just as much, will be produced. If fall planting is done the plants should be set out by the middle of September, and well mulched on the approach of winter. The question of pruning is an important one with the raspberries, and one on which a great difference of opinion exists. Great stress used to be laid on the value of summer pruning, and for the black-cap it is all right. The black-cap propagates itself by rooting at the tip, and its efforts are bent in the direction of making strong canes. Pinching back the young canes, therefore, when about two feet high will have excellent results. The cane will soon throw out a number of laterals, and a self-supporting strongly-branched bush will result (see Figs. 87 and 88). With the red raspberry the case is different, the pinching back of the young canes induces the plant to produce more suckers, and the laterals, which are eventually thrown out, are often weak and get killed back during the winter. Cultivate shallow and often during the summer, letting the

canes grow their full length. In the late fall cut out the old canes which have fruited, and in the spring remove superfluous canes, leaving only four or five in a hill, and cut back the remaining canes to a height of about three feet. The work of removng dead, and even superfluous, canes is usually done with more convenience in the fall, and there is practically nothing in the idea that by leaving them additional protection is afforded to the plantation. In districts where the cold is so severe that the raspberry will not stand without winter protection, the pinching back of the young shoots when not more than eighteen inches high may be practised. A low bush will be formed which will be covered with the snow. Or bending down and covering may be done. Before frost comes remove the canes as suggested above, leaving about four canes to the hill. One man with spade or shovel then removes a little earth from the base of the plant, the other presses down the canes with a fork and the first man puts earth enough on to hold them in place. Such canes must be carefully taken up in the spring when danger of frost is past, but not left long enough to start growth. If such a practice is adopted it will be necessary to put up a wire trellis to support the canes. A convenient kind in which the wires are easily removed is shown in Fig. 89.

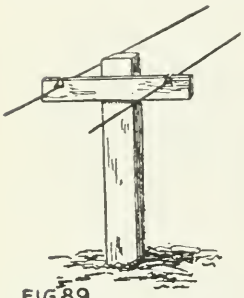


FIG. 89. Trellis for berries.

If covering is not practised where the winter is severe, but reliance placed on a deep covering of snow, it is important to pinch back the canes early. Figs. 90 and 91 will show how to get a short sturdy bush with good laterals.

Varieties. Black—*Southegan*, *Hillborn* and *Gregg*. Very promising new kinds are, *Older*, *Conrath*, *Smith's Giant*. Red—*Marlboro'*, *Cuthbert*. Yellow—*Golden Queen*. The best purple variety—*Shaffer* and *Columbian*.

CARD

Root-gall of raspberry.

FIG. 90. Well pruned.

FIG. 91. BAILEY

Poorly pruned.

Insects. The raspberries are fairly free from insect pests of a very destructive character. The snowy tree-cricket occasionally slits the canes, depositing in the pith a number of yellowish, cylindrical eggs. Such canes can be removed and burnt. The young crickets feed on plant lice, so they probably do as much good as harm. The crown-borer and cane-borer are sometimes injurious, but infested canes can be readily seen and should be removed and burnt. The small green larvæ of the raspberry sawfly are frequently injurious to the foliage. These can be destroyed by an application of hellebore, one ounce to three gallons, or with Paris green. Of diseases, the two worst are *anthracnose* and *root* or *crown gall*. The former, a fungus disease, attacks all parts of the plant above ground, showing on the young canes in grey blotches and discolorations, leading to weakness of the cane, which sometimes dies before fruiting, or on which the fruit is poor and shrivelled. Bordeaux mixture will assist in checking this disease, but it is well in small plantations to at once root out and destroy all sickly canes.

The cause of root or crown galls is very obscure, and one can only advise the rejection and burning of all plants so affected at planting time.

THE BLACKBERRY.

Much of what has been said as to necessary conditions in successful raspberry culture is equally true in its application to the culture of blackberries. The hardy, vigorous nature of the plant enables it to survive under very unfavorable conditions, and for this reason sufficient attention is not always given to its real needs. It will thrive on a heavier soil than the raspberry, but moisture is essential, and if the soil is not deep and porous it will be necessary to make it so by underdraining. Ripening late in the season, drouth is usually its worst enemy, and must be fought by proper drainage and cultivation if the magnificent possibilities of this fruit are to be realized. The blackberry, especially when in full bearing, will amply repay liberal treatment in the matter of manure. Propagation is by means of suckers. Planting may be done in the fall if a thorough covering is put on the newly set plants for the winter. In spring planting, the last year's growths should be dug and planted as early as possible, so as to give every chance for the production of good canes in the second year. Some of the most successful growers practice the hill method of culture, planting some seven feet each way. When in rows, eight feet between the rows and three feet between the plants is advisable. For the first two years, hoe crops may be put between the rows. As the rows fill out, and a larger number of suckers are produced, it will pay to reduce the numbers through the growing season by cultivation and hoeing. From the grower's point of view a superabundance of suckers may be regarded simply as weeds, robbing the plants of both moisture and food. In gardens, and where the ground is likely to become very dry or hard towards fruiting time, a pretty heavy mulching will yield excellent results. Summer pruning is absolutely necessary if a strong compact hedge is to be formed. The young plants should be pinched back when from two to three feet high; the cane will produce a number of vigorous laterals, which should be pruned back the following spring to about eighteen inches in length. Stress must be laid on the necessity for this early pinching back. Figs. 90-91 in the chapter on the raspberry shows the difference between the early and the late pinching back process. A top-heavy, awkward lot of canes will be the result of deferring this work, to say nothing of an undue amount of broken canes, scratched hands and torn dresses. Fig. 91A shows the neat, compact and properly pruned bush, and Fig. 92 a neglected cane. It will be necessary to have a wire trellis where laying down canes for winter is practised; two wires are sufficient, even one will often answer the purpose, and in fact under most conditions the support of a wire will do much to keep the row in good shape.

FIG 91 A THOMAS

FIG 92 THOMAS

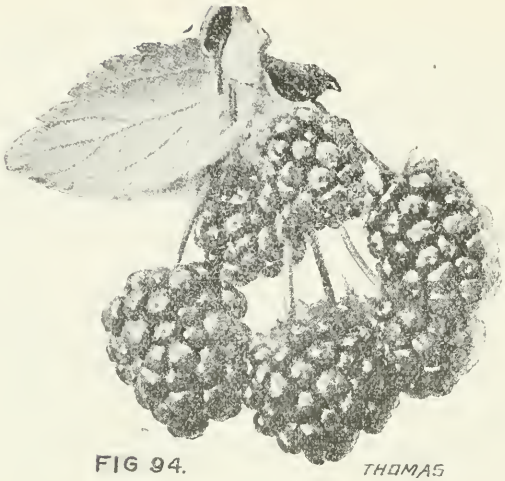
Fig. 93 is an illustration of a well-kept plantation with the trellis support. The operation of laying down for winter was described under the raspberry. The varieties chiefly grown are

Low training of blackberries.

FIG 93 CARD

Snyder, *Kittatinny*, *Lawton*, *Taylor* and *Early Harvest*. Of these *Kittatinny* is the best quality, fairly hardy and productive, though rather subject to "red rust." *Agawam* and *Snyder* are both hardy and productive, though not very high in quality.

The only disease which very seriously or widely interferes with blackberry is the red or orange "rust." This fungus spreads with great rapidity, and although systematic spraying with Bordeaux mixture may check it to a certain extent, the infested canes should be cut out



Snyder.

Kittatinny.

and burnt immediately they are noticed. A careful watch should be kept for the first sign of trouble, and only perfectly healthy plants set in. The diseased plants are easily distinguished from the peculiar golden color of the leaves in early spring, and the subsequent covering of the leaf with a mass of orange-colored spores.

Raspberry leaf affected by orange rust.

Blackberry leaf affected by orange rust.

GENERAL DEPARTMENT.

THE MANAGEMENT OF BEES.

By J. Fixter, Ottawa.

Summer Management of Bees. The apiary should be located near the dwelling house, so that the bees can be easily watched in the swarming season. A high fence or close hedge around the apiary will protect the hives from cold winds in spring and autumn, and it is well to have no high trees in or near the apiary, as when swarming the bees are likely to light in them, and thus give you considerable trouble in securing the swarms. Also, an apiary surrounded by high trees is too much shaded in early morning, and the ground is generally kept much damper than it should be if the best results are to be expected. When setting the colonies out in the

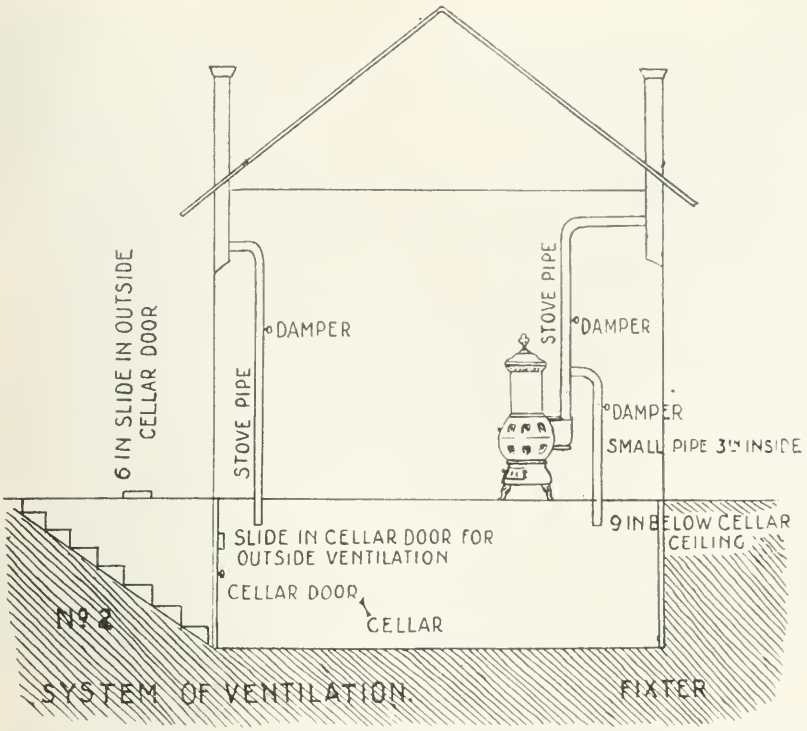
spring, they should be placed on the same stands from which they were removed the previous autumn. I advise placing the hives on their summer stands early in spring; do not wait until the soft maples and early willows bloom, as is practised in many sections; take advantage of the first calm day when the temperature is about 60° F. When carrying the bees out have the weighing scales near at hand, also clean bottom boards to change. When removing the hives from the winter quarters, leave the old bottom boards to be cleaned. When weighing, note the number and weight of the hive, for guidance as to the amount of stores left to carry the colony over until the honey flow. After the bees have had a good flight and have settled down, examine each colony and see that it contains a good laying queen and plenty of stores. Should there be insufficient honey, give them a frame as close to the brood as possible, also close the entrance, according to the strength of the colony—if the colony is very strong, the entrance may be left about two inches in width; if weak, close down to about one-half inch. Great care should be taken to protect the hives from the cold draughts in spring; many days the bees in the house apiary and sheltered apiary will be flying and gathering honey and pollen, while the bees in the exposed apiary are at home keeping the cold air off the brood. If you have a propolis quilt or chaff cushion on the hives, leave it there until the colony is strong enough for a super for sections, or the extracting frames. The time for supers is when the hive is full of bees and there are good prospects of a honey flow. By allowing plenty of room, swarming will be prevented to some extent. In this section of the country care should be taken to see that each colony has plenty of honey between the fruit bloom and clover bloom. Many failures at this period are due to lack of stores, and too much attention cannot be paid to this point. I would advise feeding, if necessary, up to the clover bloom, to force brood-rearing: have your

colonies strong. When feeding has to be done, take two parts of granulated sugar to one part of water ; boil the water, remove from fire, then add sugar and stir until dissolved. This syrup may be fed luke-warm in the evening by taking out one of the empty combs and holding it in a slanting position, then pour the syrup gently over it until every cell is full, then the frames should be returned to the hive. Should you have full frames of honey on hand, I would advise to uncap and use them for stores, especially if the honey is dark. When the honey-flow and swarming is on have everything in readiness to receive the swarms ; the supers should be filled with sections, the latter having full sheets of foundation ; the extracting frames should have full sheets of foundation in them and be wired, to prevent the heavy combs from breaking when being extracted. The time to remove section honey is when the supers are fairly well filled and capped ; do not wait until the corner ones are filled, as they may be put back in the next super. When removing the section honey, start shortly before sundown ; smoke the bees at the entrance ; take a wide chisel and pry off the super and stand it on end close to the entrance of the hive ; leave it there a short time, then remove to the honey-room, leaving the door and windows open all night. By the following morning all the bees will have returned to the hives or to the fields ; the door and windows should then be closed, or else robbing will take place. Do not allow comb honey to remain on the hive to be daubed after the sections are sealed. Remove the honey to a very warm, dry room, where it will ripen thoroughly. The extracting frames may be tiered up and left on the hive to ripen until the honey season is over. When removing extracting frames, a Porter bee-escape is placed between the extracting super and the brood-chamber, and at night the bees descend through this and are prevented from returning. When all the bees are down, remove the frames to the extracting room.

Swarming may be forced or prevented as desired. If swarms are desired crowd the bees and stimulate them with syrup. I would not advise more than one swarm from each colony. To prevent swarming, allow the bees plenty of room ; do not wait until they swarm. Put on the supers as soon as the colony is strong enough to work in them. Should swarming occur, remove the hive to another stand ; take a different hive, put the swarm into it and place it on the stand from which the swarming hive was removed. The old colony may be further weakened by taking out several frames and shaking all the bees off in front of the newly hived swarm, thus strengthening it. Only leave a sufficient number of bees in the old hive to cover the brood. Should the swarm settle on a very high tree, use one of Mann's swarming devices with extended poles ; or a pail may be nailed on the end of a pole, which will serve the same purpose. If the swarm settles on a low tree or shrub, spread some sacking on the ground immediately beneath them and in front of a hive, give the limb on which they are resting a sharp jar, and the bees will fall on the sacking and soon find their new home. If the swarm is a strong one, place extracting frames or sections on the hive as soon as the swarm is placed on the stand. Many apiarists advocate clipping the wings of the queens, in order to keep the swarm. This plan is very good for an experienced bee-keeper, but I would not advice a novice to attempt it, as there is risk of loosing the queen. Now that the honey season is about over and swarming has ceased, prepare for winter. About the middle of August, or not latter than September 1st, examine every colony and see that it contains a good laying queen, and a strong colony with plenty of stores. Should the colony be weak, increase the number of bees, as it will not pay to winter a weak colony. If they are short of stores, say, less than twenty-five pounds of sealed honey, I would advise feeding, which should be done when the weather is moderately warm ; then if you require to add ten pounds in weight, it will take about fifteen pounds of syrup. Have the colony and Langstroth Hive weigh fifty pounds for wintering. The colonies should be examined several times between September 1st and November 1st ; also, see that no robbing is going on, because once the bees get started it is a difficult matter to stop them. If they are robbing, at once close the entrance for a short time with something which the bees cannot push away ; then open the entrance for a few moments and again close, repeating this until all the robbers have come out ; after which leave the entrance so closed that only one bee at a time can pass in or out. By partially closing the entrance the colonies will be able to guard their hives. The time to place the colonies in winter quarters is just before the first heavy frost or about the time the land becomes frozen too hard to be plowed.

Various Methods of Wintering Bees. As the wintering of bees is a matter of no small importance if you would be successful with your apiary, the following remarks on the various methods which I have tried for several years past may contain some points of interest and value. I shall, therefore, relate my experience as briefly as possible with the hope that the reader may glean therefrom some suggestions of practical use. Of the different plans tried, four were in a cellar, one in a root-house, one in a pit dug in a hillside, and one in a house-apiary.

Wintering in a Cellar. The cellar in which colonies were wintered is below a private house ; the walls are of stone, the floor of cement. A twelve-inch layer of small stones beneath the floor allows of free drainage, thereby keeping the cellar perfectly dry. The bee-room—which is boarded off from the remainder of the cellar by a partition extending all around the chamber,


6 IN SLIDE IN OUTSIDE CELLAR DOOR
STOVE PIPE
DAMPER
STOVE PIPE
DAMPER
DAMPER
SMALL PIPE 3½ INSIDE
9 IN BELOW CELLAR CEILING
SLIDE IN CELLAR DOOR FOR OUTSIDE VENTILATION
CELLAR DOOR
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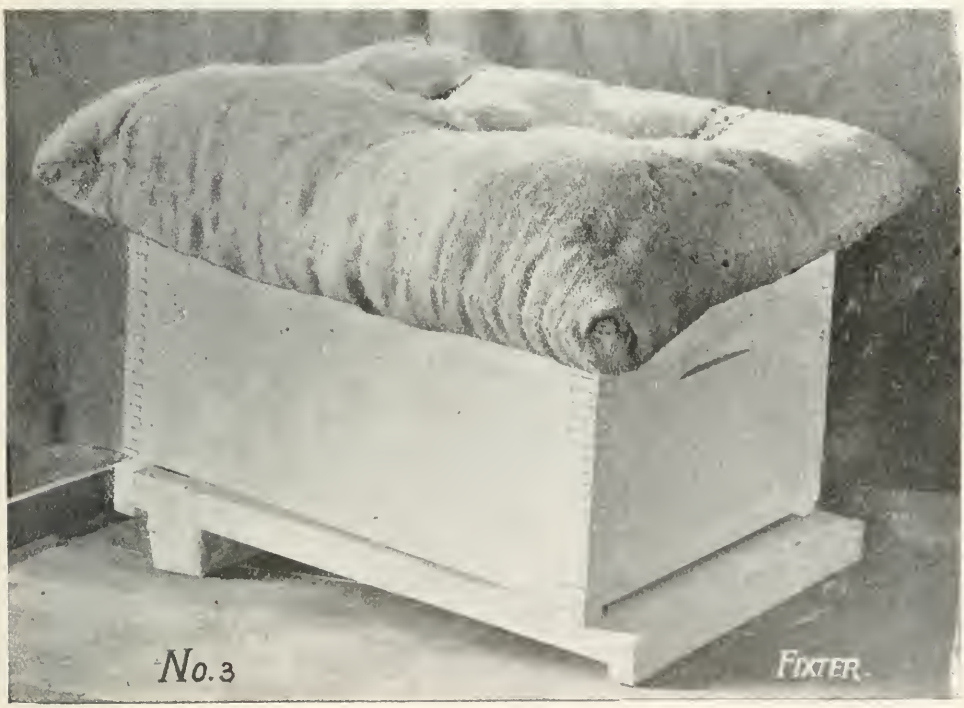
SYSTEM OF VENTILATION.
FIXTER


No. 3
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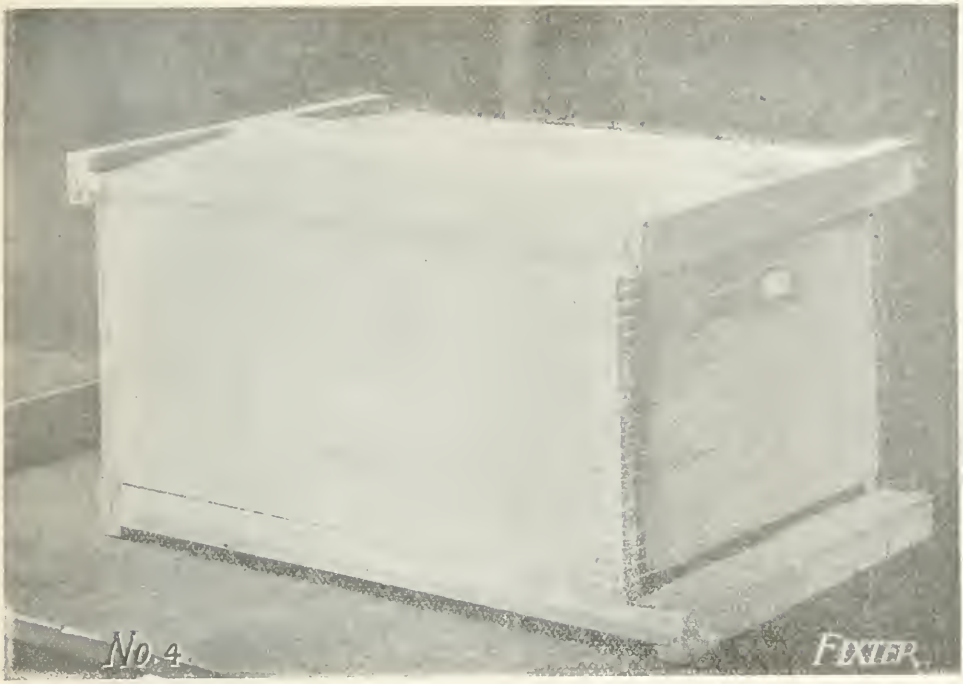
and far enough away from the walls to allow of a small air space—is eleven feet six inches wide, fifteen feet long and seven feet high, allowing of three tiers of shelves and two passages. The lowest shelf is eighteen inches from the floor; the second twenty inches clear of the lowest, and the third twenty inches clear of the second. Neither the hives on the third shelf nor the uprights supporting the shelves, nor the partition around the bee-room touch the ceiling, so that the hives are not disturbed by vibration. The entrance to the bee-room is through a small ante-room, which communicates directly with the outside. The bee-chamber and the cellar are kept thoroughly ventilated by means of sliding ventilators in the bee-room and in the ante-room; a three-inch pipe passing from the bee-room up to a stove-pipe provided with a damper regulating the draught. See cut No. 2. The temperature of the cellar is best kept between 42° F. and 46° F.

This arrangement has given entire satisfaction. Formerly the ventilation and drainage were not perfect, and it was a difficult matter to keep the cellar dry: but since the concrete floor has been laid and the ventilators put in there has been no trouble in keeping the cellar dry and clean. It is also now rat and mouse proof, which is great consideration. The difference in the amount of honey consumed by the bees wintered in the cellar since it has been properly drained and ventilated is very marked, being only about one-half the amount consumed when wintered in the old cellar. A coal stove, which was formerly necessary in order to keep the cellar dry, has been removed. I would not advise anyone to use artificial heat in a cellar for wintering bees.

Cellar, Plan No. 3. Two colonies of bees in Langstroth hives were put into winter quarters in the cellar, and placed on the shelves. Under the back end of each hive was placed a three-inch block, by means of which the back of each hive was raised so as to ensure free ventilation. Each hive was also raised from its own bottom-board by a small three-eighths inch block placed at the back. All front entrances were left wide open: the wooden covers were all removed and replaced by cushions made of chaff four inches thick and long enough to lap over the hive two inches. The temperature of the cellar was taken once a week all through the winter: November, 46° F. to 47° F.; December, 47° F. to 48° F.; January, 44° F. to 46° F.; February, 46° F. to 50° F.; March, 48° F. The bees were quiet, only a slight hum being noticeable up till February, when the temperature rose to 50° F., and the bees began to get uneasy and make a considerable hum. Cold air was carefully let in by opening the slides in the doors at night and closing them in the morning. This lowered the temperature and the bees quieted down. During the past winter every colony in this experiment was perfectly dry and clean, and all came out in excellent condition. Average weight of each hive when put into winter quarters, 53½ lbs.; when taken out, March 26th, 44½ lbs., showing that each hive had lost 9 lbs., which is very much less than the usual amount. This small consumption is no doubt owing to the mode of arranging the hives and to the comfortable cellar. In former years, before this same cellar was arranged as it is, the hives lost on an average 20 lbs., which represents the weight of honey consumed during the winter. Not only was the consumption of honey very small, but the bees came through in splendid condition, which is an important point.

Cellar, Plan No. 4. Two colonies were put into the cellar on 12th November, with tops and bottoms of the hives left on just as they were brought in from the bee-yard. They were watched for dampness and to compare the amount of honey consumed. The temperature of the cellar was the same as in Plan No. 3. During December and January the bees in both hives made a considerable hum. On the 27th December drops of water were noticed all along the entrance of both hives. This same trouble continued during January. Both hives were then ventilated at the bottom by means of a three-inch block being placed in front between the bottom board and the brood chamber. During February and March both hives were perfectly dry and quiet. On the 26th of March the colonies were removed to the summer stands in fairly good condition, one had spots of faeces at the entrance, and the combs were slightly mouldy, but there were very few dead bees in either of the hives. Average weight when put into winter quarters, 62½ lbs.; when taken out, in March 26th, 48 lbs., showing that each hive had lost 14½ lbs.

Root House, Plan No. 5. Two colonies were stored in a root-house. The hives were placed on a shelf nailed against the wall, about three feet from the ceiling, and projecting two feet. A curtain was hung from the wall over the top and down in front of the hives so as to exclude all light. The wooden covers were removed from the hives and replaced by chaff cushions. Strips of wood 2x2 inches were placed at each corner of the brood-chamber and the bottom-board so as to give more ventilation at the bottom; both back, front and sides were left wide open. In former years, the hives kept in a root-house did not appear to have ventilation enough. This extra space has proven very satisfactory. The temperature was taken every Monday: November, highest temperature, 38° F.; lowest, 36° F.; both hives quite dry, but very noisy. December, highest temperature, 42° F.; lowest, 36° F.; mice had found their way into the hives and disturbed the bees; strips of tin were fastened around the shelf to preven


No. 4.
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further inroads. January, highest, 41° F.; lowest, 39° F. During January the hives had drops of water along the entrances, and the bees were making a considerable hum. No trouble with mice. February, temperature, 38° F. to 39° F.; colonies fairly quiet. March, temperature, highest, 40° F.; lowest, 36° F. The hives were quite damp. March 26th, hives showed signs of dysentery, dampness and mould, but were very strong in numbers. Average weight of each hive when put into winter quarters, 57 lbs. 12 ozs.; in spring, 44 lbs. 12 ozs., a loss of 13 lbs. per hive.

Pit in Hillside, Plan No. 6. (Same arrangement of hive as No. 3). Two colonies were put into a pit dug in the side of a hill, three feet deep, three feet wide, and ten feet long, in such a way that the ventilator at each end might not be immediately above the hives, which were in the middle of the pit. The hives rested on two cedar poles laid along the full length of the pit. The ventilators were two wooden shafts 3 x 4 inches, rising three feet above the ground, with three sides reaching to the bottom of the pit and one to the top of the pit. The wooden covers of the hives were removed and replaced by chaff cushions. Strips of wood 2 x 2-inch were laid under both sides of each, under the back end between the brood-chambers and the bottom-boards, so as to provide more space at the bottom of the hive in case a quantity of dead bees should accumulate there. The pit was covered with cedar poles laid along its length, the middle ones higher than the others, and then covered with a layer of straw and one foot of soil. A small shaft was arranged between the hives, down which a thermometer could be lowered by means of a string, so that the temperature could be ascertained. The temperature was taken once each week. From November to March the temperature in the pit did not fall below 38°F. or rise above 39°F. Weight of each hive in the autumn, 62 lbs; spring, 50 lbs. 6 oz, a loss of 11 lbs. 10 oz. each hive.

House-Apiary, Plan No. 7. (Same arrangement of hive as No. 5). Two colonies were left in the house-apiary with some additional packing. The house-apiary faces the south; the walls are double boarded, with an air space of four inches. The floor is about one foot from the ground, and is also double-boarded, to exclude all draughts The hives were moved one foot from the wall and placed on a double thickness of sacking laid on the floor; the wooden covers were removed and replaced by chaff cushions. In addition to this the hives were covered above and all round with a double thickness of sacking; also, one foot of cut straw was put below and all around. A small shaft one and a half inches square, extended from the opening of each hive to the outside of the shed; two-inch strips of wood were placed under each corner between the bottom-board and the brood chamber of each hive, so as to give more space at the bottom, in case of an accumulation of dead bees. Bees did not fly from November until March 8th. In spring each hive weighed 16½ lbs. less.

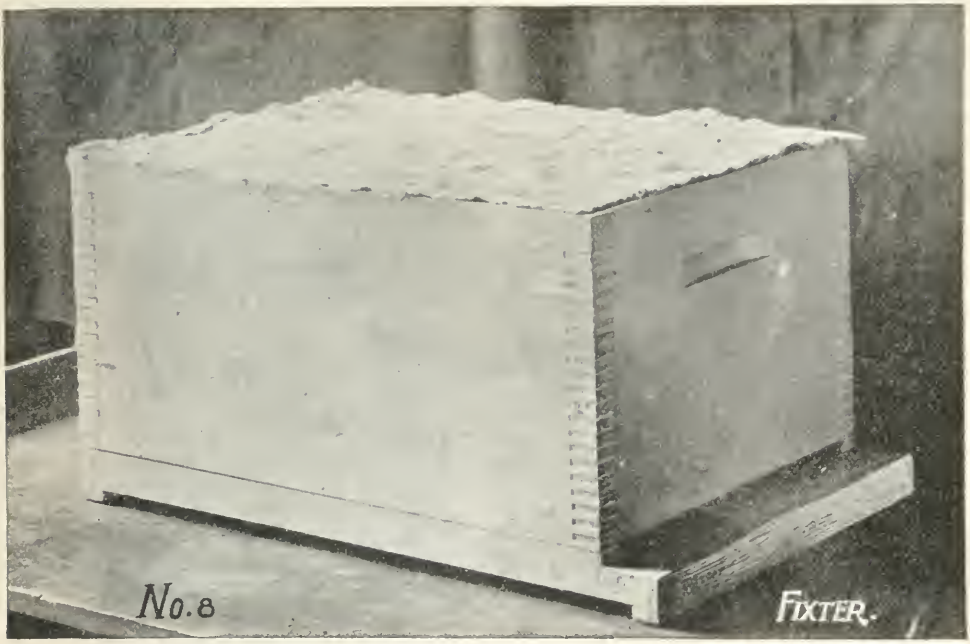
Cellar, Plan No. 8. Two colonies were put into the cellar with the bottom of hives left on, just as they were brought in from the bee-yard. The wooden covers were removed and nothing left on except a tightly sealed propolis quilt; the entrances were left wide open. During the entire winter the bees kept perfectly dry, and a very slight hum could be heard. Average weight of each hive when put into winter quarters 52¼ lbs.; when taken out there was a loss of 10 lbs. 12 oz. per hive.

Cellar, Plan No. 9. Two colonies were put into the cellar and placed on shelves, a three-inch block being placed between the bottom-board and the brood-chamber in front, making the full entrance three inches high across the whole front. The wooden covers were removed and replaced by chaff cushions. The temperature was the same as in plan No. 3. During the whole winter both colonies were perfectly dry and clean, and showed no uneasiness of any kind. They came out in spring in excellent condition. Average weight of each hive when put into winter quarters 58¼ lbs.; when taken out in March, 47 lbs. 10 oz., showing that each hive had lost 10 lbs. 10 oz.

Conclusions. No. 3 has given entire satisfaction for the past five years. The amounts of honey consumed during the winter per colony were: 1894-95, 12 lbs. 9 oz.; 1895-96, 10 lbs.; 1896-97, 9 lbs. 6 oz.; 1897-98, 9 lbs.; 1898-99, 11 lbs. 14 oz. An average for the five years of 10 lbs. 8

No. 4. Hives put into the cellar as they came from the bee-yard had not sufficient ventilation. This result agrees with that of the past four winters. The amounts of honey consumed during the winters per colony were: 1895-96, 13 lbs.; 1896-97, 11 lbs. 8 oz.; 1897-98, 14 lbs. 8 oz.; 1898-99, 13 lbs. 10 oz. An average for four years of 13 lbs. 2½ oz. Although the amount of honey consumed was not large, the vitality of the bees was not as good as several of the other trials.

No. 5. This trial was again fairly satisfactory. Although an extra space of two inches was given at the bottom the hives were damp and mouldy. Considering the amount of disturbance the bees were subject to in this trial, I would consider that they came out well. Once or twice each week the large doors of the root-house were thrown wide open to allow the teams into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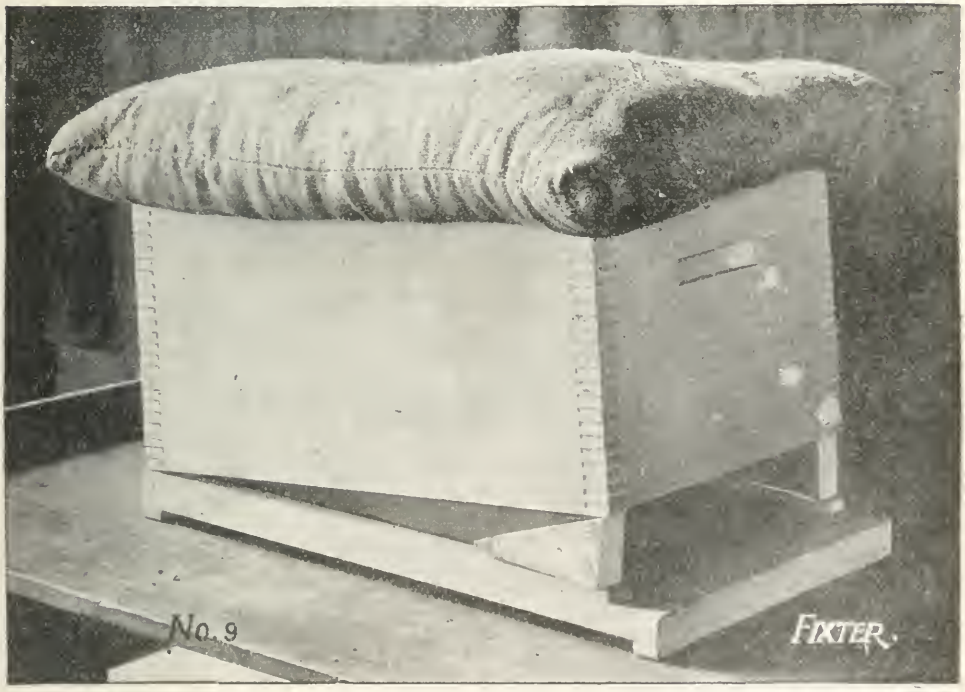
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draw out roots, and thus considerable cold air was suddenly admitted to the hives. Also, the teams drawing over the floor jarred the hives very much. The amounts of honey consumed per colony were: 1896-7, 14 lbs.; 1897-8, 14⅛ lbs.; 1898-9, 14¼ lbs. An average of 14 lbs. 4 ozs.

No. 6. This test has been very satisfactory. Care is necessary to ensure good ventilation, and to see that no water enters the pit. The amounts of honey consumed per colony were: 1896-97, 9 lbs.; 1897-98, 11 lbs. 10 ozs.; 1898-99, 12¼ lbs. An average of 10 lbs. 15⅓ ozs.

No. 7. This test was again a failure. The extra packing with one foot of cut straw was not sufficient to keep out the cold. I would not advise anyone in sections where the temperature falls to 15° below zero to winter in a house-apiary. The amount of honey consumed per colony was: 1876-97, 15½ lbs.; 1897-98, 16½ lbs.; 1898-99, 15½ lbs. An average of 15 lbs. 13 ozs. per hive.

Under the conditions of this trial, besides consuming a larger amount of honey, the bees came out in a very weak state, and the colonies either dwindled out or did very little good during the following summer.

None of our trials in wintering out of doors have given the same satisfaction as those in the cellar, roothouse or pit, even when extra packing was given.

No. 8. This mode of wintering has given satisfaction the past two winters, and will be tried further. The amount of honey consumed per colony was: 1897-98, 10 lbs. 12 ozs.; 1998-99, 12 lbs. 8 ozs. An average of 11 lbs. 10 ozs.

No. 9. This test has given the very best satisfaction and can be highly recommended. The amount of honey consumed per colony was: 1897-98, 10 lbs. 10 ozs.; 1898-99, 10 lbs. 5 ozs. An average of 11 lbs. 7½ ozs. per hive.

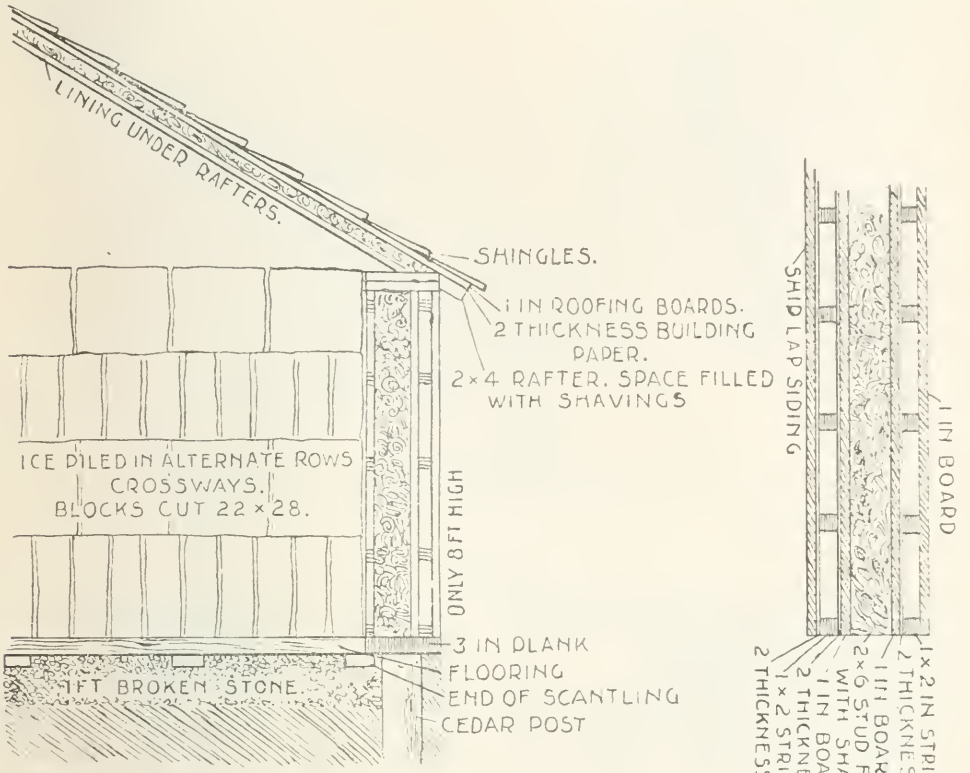
CONSTRUCTION OF AN ICE HOUSE.

By Robert Thompson of St. Catharines.

In selecting a site there are certain precautions to be taken in order to secure a good bed for ice. If the site selected be on a little rise above the adjacent ground level, surface drainage will give no trouble; otherwise provision for it as well as for the water from the melting ice must be made. The house may be placed on a stone or concrete foundation or on cedar posts set in the ground two feet at least. Excavate fully one foot below the sills and fill with cobble stone or very coarse gravel the whole of the inside between sills, smoothing off the surface with fine gravel or cinders. If the digging shows a clay soil a drain should be put in to carry off surplus moisture, to run well under the gravel. Scantlings can be bedded in the fine gravel on which to lay a floor of cheap lumber, the boards being placed one inch apart in order to permit the water to pass through readily.

It takes on an average from 40 to 45 cubic feet of space to hold a ton of ice. Consequently a building 12 feet by 16 would hold about 45 tons of ice, well packed. It requires 3 by 12 sound pine plank for sills, and for uprights 2 x 6 scantling 12 feet long placed two feet apart at each corner, putting in an extra piece to catch the lining on the inside, on the top 2 by 6 doubled for plates. On the outside is nailed sheathing of common lumber on which is tacked a double thickness of building paper, then strips 1 x 2, 12 feet long, one foot apart, over this a double thickness of building paper and finished with matched sidings. This provides a hollow space of dead air of one inch to prevent the sun's heat penetrating to the inside lining, care being taken to see that the space is well cut off at the top and bottom. On the inside is nailed sheathing, and the six inch space is filled with cinders, shavings or sawdust, as is most convenient. On this sheathing is nailed a double thickness of paper on which is nailed 1 x 2 inch strips again, and on these sheeting. This secures two hollow spaces of dead air of one inch each, and one space of six inches, filled as before mentioned. There are in all six thicknesses of building paper, three of sheathing and one of good siding.

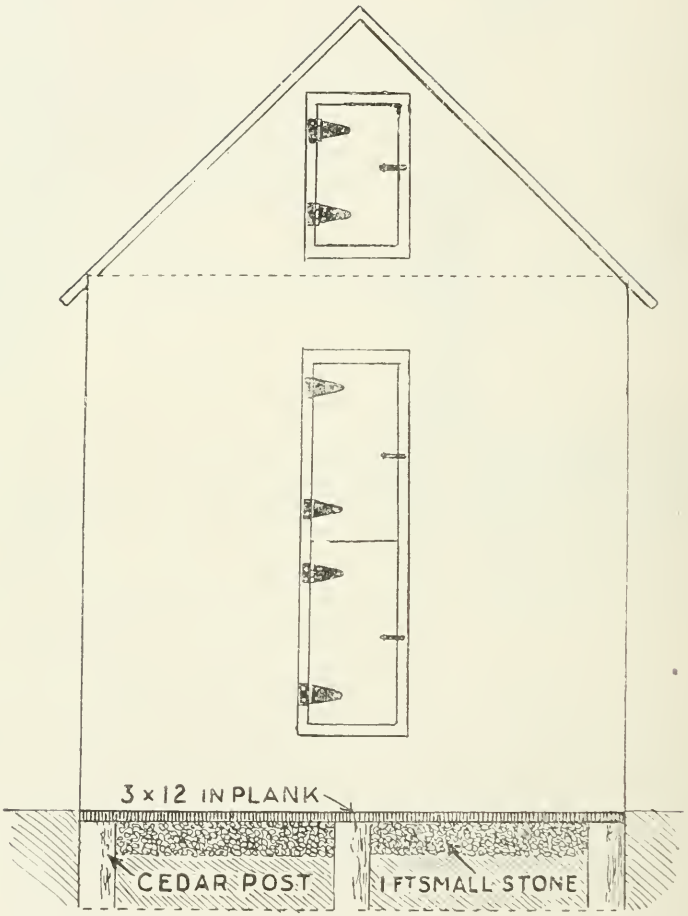
The roof is constructed of 2 x 4 rafters with the under side lined and filled between the rafters with dry shavings. Under the shingles are two thicknesses of building paper and a ventilator is placed in the centre of the roof, constructed so that it can be closed inside if desirable. The door should be made in two halves, and a door in the gable over the plate to put in and remove the two top layers of ice. The gables should be built the same as the walls. Painting the building white will help to keep it cool. The total cost of a building constructed on this plan is $65, not including the time consumed in the work. In filling the house place the ice on its edge, with every alternate layer crossways. Opposite the doors lay short pieces of boards, filling the door space with shavings. Two feet of straw or marsh hay placed over the ice when the house is full, and tramped down well will preserve the ice as well as sawdust, this is being largely used as a substitute.



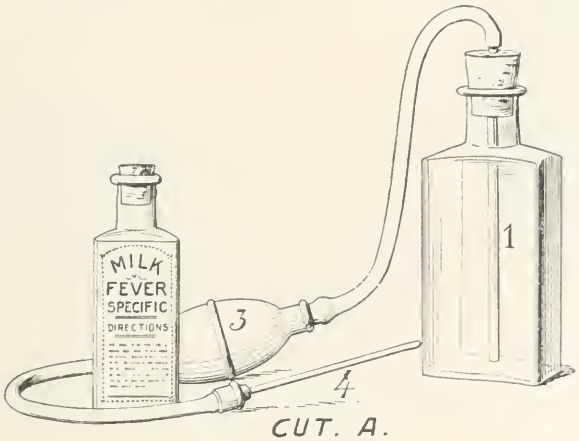
END VIEW OF INTERIOR

Cost of House, Bill of Lumber, etc., Used

Sills, 2 pcs.	3—12—12	= 72 ft.	pine.	
" 2 "	3—12—16	= 96	"	
Cornice boards		75	"	
		243 ft. at $15.00		= $3.65.
Studs 32 pcs.	2—6—12	= 384 ft.	pine.	
Plates 4 "	2—6—12	= 48	"	
" 4 "	2—6—16	= 64	"	
Studding for:				
Gables 4 "	2—4—14	= 37	"	
Rafters 18 "	2—4— 9	= 108	"	
Strips 60 "	1—2—12	= 120	"	
3 thickness sheeting over all		2 268	"	
Roofing		325	"	
Lining roof		250	"	
Flooring		140	"	
Scantling for floor, 5 pcs.	2—4—10	= 35	"	
		3,779 ft. at $11 00		= $41.57.
Siding, matched	4' 0 ft. pine		"	15.00 = 6.75.
Shingles 3½ sq. xxx cedar			"	1.75 = 5.69.
12 rolls sulphite building paper, per roll			"	.50 = 6 00.
				$63 68



End elevation of ice house with doors.



CUT. A.

Parturient Apoplexy.

Fig. A. Instrument for administering Schmidt Milk Fever Treatment.

Fig. B.—Instrument as it appears in the hands of operator.

Note.—The above illustrations (Figs. A. and B.) are referred to on page 122.

BINDING SECT. AUG 23